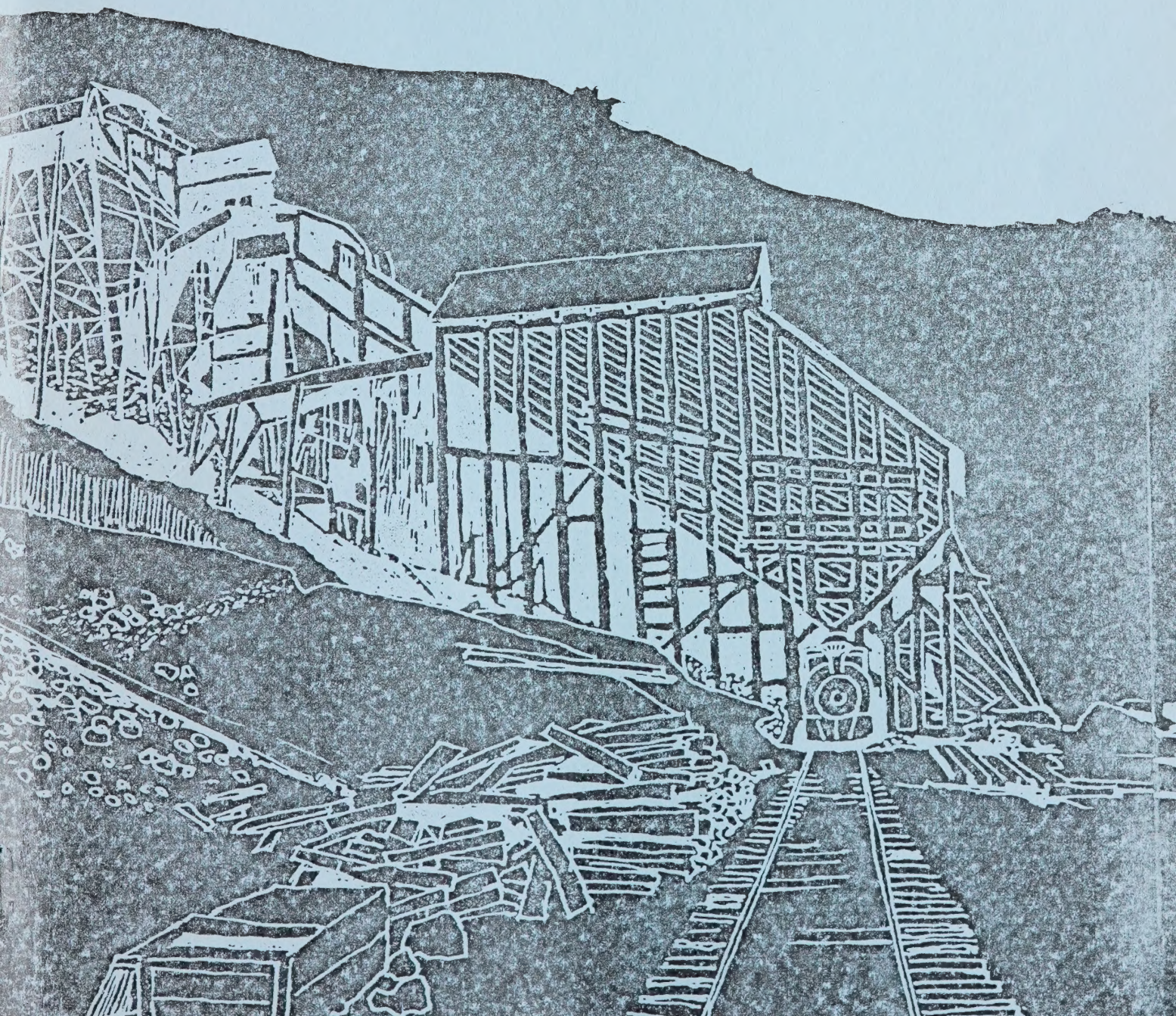


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The Story of BLACK DIAMOND MINES



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THE STORY OF BLACK DIAMOND

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Compiled and edited by Walter Knight.

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BLACK DIAMOND MINES

by John Waters

(Published in "Underground Space", official journal of the American Underground Association, August 1977, Permagon Press).

Black Diamond Mines Regional Preserve is a recent addition to the East Bay Regional Park District, a two-county park agency on the east side of California's San Francisco Bay.

This park is noted for its botanical, geological and wildlife resources, and is also the site of 100 year's of coal and sand mining activity. The nineteenth century coal mining operation was California's largest, and the twentieth century silica sandstone mines produced high quality glass and foundry sand. When the mines were abandoned, many openings were left into extensive mine workings. Over the years, many people have been injured or killed exploring these mines.

Black Diamond Mines is a valuable geological classroom. Fifty to sixty million year old marine sandstones and shales, pushed up to steep angles by the emergence of nearby Mt. Diablo, have been eroded into steep ravines and striking sandstone ridges. Unlike the rolling hills that cover much of the Bay Area, this rugged topography clearly shows millions of years of its geological development.

The preserve also has botanical importance. Stands of Coulter Pine and Black Sage are at the northermost limit of their distribution there, and several rare plant species have been found among the valley grassland, oak woodland and chaparral plant communities.

Although the climate is harsh, with hot dry summers and few water sources, the preserve supports a rich wildlife population. The Golden Eagle is among almost 100 species of birds that have been identified within the park's boundaries. The caves formed in the sandstone outcrops are a favorable habitat for the primarily nocturnal animals. Tracks of deer, fox, raccoon, coyote and mountain lion are among those found in the sandy soil.

Of most interest to the general public, however, and most dramatic in terms of its potential, is the 100 year history of mining at Black Diamond Mines. From the mid-1850's to the turn of the century, California's largest coal mining operation was active on what is now the preserve, and from the early 1920's to 1949, underground sand mines there produced high quality glass and foundry sand.

It isn't known when Mt. Diablo coal first came to the attention of California pioneers. Vague references date back to the early 1840's in letters to Eastern newspapers and in a report from the French Embassy in San Francisco to its home office. Official discovery is usually credited to rancher William Israel, who in 1852, discovered an outcrop of coal in a spring that supplied stock water. A friend of Israel's attempted to develop a small mine, but failed and extensive development did not start until more experienced miners began operation in 1853.

The coal was sub-bituminous lignite of poor quality. It was found primarily in three veins that seldom exceeded one meter in thickness. The veins, called

the Clark, the Little and the Black Diamond, dipped at a steep 28 to 30 degrees. The coal was often sandwiched between layers of soft clay rock and shale that the miners called bone, that was likely to swell or cave into the workings when the coal was removed. Despite its low quality, the coal found a good market. Coal was the prime energy source of the 1800's and California, poor in this resource, was forced to import it from England, Chile or Australia. The high transportation costs of the foreign product gave a competitive edge to even a low quality, locally mined coal.

A mining boom developed on what became known as the Mt. Diablo Coal Field. The field was one kilometer wide and almost 17 kilometers long, but only a four kilometer portion, located within the present park boundaries, was notable for production and quality. While mining engineers considered that a single mine would have exploited the profitably mined area of the field, more than a dozen mines and six towns developed in the boom. Three railroads were built, all with railheads within three kilometers of each other.

By the mid-1870's, mining activity was at its peak and the towns of Nortonville and nearby Somersville, each with a population of about 1000, were the county's largest communities. Many of the early mines had been closed or consolidated, leaving only the Black Diamond, Union, Pittsburg and Central.

The miners were primarily Welsh and Irish, driven from the British Isles by an economic depression. They mined the coal by the light of oil lamps, often with only one meter of headroom. They pushed the coal through these cramped quarters for as much as 150 meters to the gangways over sheet steel greased with whale oil. There it was loaded into mule-drawn cars for transportation to the surface. The coal was transported from the mine by railroad to landings on the San Joaquin River, six miles away. Boats, often coal-powered, carried the product to markets in San Francisco, Sacramento and Stockton, where it was a common fuel in homes and mills.

The mining boom broke in 1885 when increased mining costs and a glut of foreign coal on the San Francisco market forced the closing of the largest and most profitable mine on the field, the Black Diamond of Nortonville. Nortonville became a ghost town overnight. Other mines, too poor to move to a new coal field as did the Black Diamond Company, held on until circumstances caused an increased demand for coal the following year. This demand resulted in new development in the remaining mines and the opening of two new ones. By 1902, however, the mining costs, competition from high quality Washington state coal and the advent of oil as an industrial power source, drove the last mines out of business. Almost 3,600,000 metric tons of coal had been mined, valued at more than \$20,000,000 at the old gold standard. Several plans were proposed to reopen the mines, but redevelopment attempts failed, leaving a reserve of more than 7,000,000 metric tons still in the ground.

In 1922, underground mining for silica sand began near the long deserted Nortonville and Somersville town sites. The Somersville mine produced sand used in glassmaking by the Hazel-Atlas Company in San Francisco, while the Nortonville mine supplied the Columbia Steel Works in Pittsburg, California with foundry (casting) sand. Competition from Belgian glass sand and the closing of the steel foundry ended sand mining by 1949. More than 1,500,000 metric tons of sand had been mined.

With the closing of mining, the area became grazing land, and with the rapid population expansion in the Bay Area after WW II, it became an unofficial recreation area. Fire and time erased most evidence of the mines and the towns. Ornamental trees, an old cemetery, a few foundations and the mine waste piles remained, as did more than 130 openings into at least 75 miles of mine workings. Open adits and inclines provided access into the caving and sometimes gas-filled mines. Dozens of openings were vertical ventilator shafts, one or two meters square and often more than 60 meters deep. These shafts were parts of mine ventilation systems that used natural air flow, rather than mechanical blowers, to maintain air quality in the mines. Hundreds of young "explorers" were drawn to the mines, which resulted in many deaths and injuries.

When in 1974, the East Bay Regional Park District acquired the area as a preserve, the greatest potential public resource was at the same time its greatest drawback--the old mines.

In preparing the preserve for public use, the District's initial project was to block unauthorized access into the workings. The first problem, however, was finding the openings. When the coal mines had closed, most of their records had been sent to San Francisco and had been subsequently been destroyed in the 1906 earthquake and fire. Sand mine records, too, had been lost or destroyed after the dissolution of the mining companies. The area's easily eroded soil had obliterated access roads and partially filled many openings. Heavy brush and manzanita that was almost impenetrable in some areas hid others, especially the vertical ventilator shafts. Earth fill from earlier and largely unsuccessful attempts at closure made some openings almost invisible.

While field work began on obvious openings, a historical study of the coal field was done. The purpose of the research was to determine the locations of the mines, when and how they were worked, and the extent of their workings. Local citizens, historical societies and the County Disaster Office contributed information. Old books and documents from the California Division of Mines and Geology, The California Mines Index in San Diego, and the University of California's Bancroft Library were searched for data on the mines.

When the areas of mining activity had been identified, it was often necessary to search the ground with teams of men, lined up not more than six meters apart, moving in straight lines back and forth across mapped grids. The men would walk, climb, crawl and, if necessary, drag themselves through the underbrush on their stomachs to insure that they did not deviate from their assigned search path and miss mine openings. A dog was trained to assist in this work, and was of particular use in the roughest country where ventilator shafts were invisible from as little as two meters away.

When the openings on park land had been discovered and plotted, the next problem was sealing them. This work was complicated by the necessity that it be done without damaging the park's landscape, botanical or geological resources, or wildlife habitat. The rugged terrain added to the problem. All-terrain vehicles were used where conditions permitted, but concrete and steel often moved up steep ridges on men's backs, sometimes with the aid of ropes.

Vandalism became a problem early in the project. Park District staff had not foreseen the unhappiness that would be expressed by the area's young visitors to the

closing of the mines. Destruction of early closures was widespread and reached as much as \$600 damage in one day. The construction of the closures was strengthened and redesigned to maintain mine ventilation patterns where they still existed and prevent the buildup of dangerous gasses. This was done to protect trespassers who entered the mines by destroying closures or excavating around them.

The design and construction of the closures also paid careful attention to wildlife habitat. Birds, especially cliff swallows, nested inside some mine entrances. When occupied nests were found, construction was moved to another site until migration moved the birds out of the park. Animals had established dens inside other mine entrances. In these cases, small openings were left that would deny access to people, but not to the mine residents.

Concurrent with the construction of the closures, work began on developing the mines as a public resource. One of the primary reasons for the establishment of the park was to preserve and interpret the mining history, and the most direct experience of that history would be to go underground into a mine.

The underground public access work was divided into two categories. The first category had to do with short sections of tunnels designed to be available for unrestricted public access. As mine closure work progressed, openings that were structurally sound and were good examples of the workmanship and the types of excavations done by the nineteenth century miners were rehabilitated and left open for short distances underground. Ten of these excavations were developed, varying in size from an 8-meter deep powder magazine to a 135-meter prospect tunnel. An unusual excavation is a one-room underground dwelling, complete with a squarecut skylight and a stovepipe running through a hole to the surface. Maps were produced that give the locations of the excavations and explain their functions.

The second category of underground development involves more extensive facilities. An investigation was done to determine if sites existed in the mines for a guided mine walk, a museum, and a maintenance and storage facility. Two criteria guided the search for suitable sites. First, since roads are inappropriate in a preserve, the facilities had to offer easy walking access from staging areas at the edge of the park. This limited the investigation to mines near the Somersville townsite. This townsite is an important historic resource in itself, and is the terminus of the only paved public road leading to the preserve.

The second criterion was that the structural integrity and air quality of the workings had to allow for economical development and maintenance. Both structural difficulties and air quality problems eliminated the Somersville coal mines from consideration. The investigation was then narrowed to a section of the sand mines containing seven kilometers of tunnels.

Preliminary planning and development work in this section began with survey and mapping. Air quality tests were made to identify problem areas. Poor air quality was corrected with additional ventilator shafts to the surface; in every case making use of natural ventilation and not resorting to mechanical systems. Miners inspected the workings to determine which areas would require the least maintenance and artificial support. This work resulted in the selection of a route for a 450-meter mine walk, and sites for a museum and a maintenance and

storage facility. Personnel from the Department of Interior, Mining Enforcement and Safety Administration (MESA), who had been assisting Park District staff in the investigations, also chose a site for a proposed mine rescue training facility.

When preliminary work was finished, a storage area of sufficient size to support full-scale development was completed and essential access and ground support work was done. Except for minor engineering and access work, the project was then suspended pending the completion of the Master Plan that will determine the development of the entire preserve, of which the underground facilities are only one aspect.

When the mine walk and museum are complete, visitors will go underground through the Hazel-Atlas Portal, one of the two original entrances into the sand mine. They will follow the adit, or entrance tunnel, as it cuts through the 90 meters of strata between the surface and the valuable silica sandstone. One of the strata they pass through contains the workings of the old Pittsburg coal mine. Although swelling clay rock has choked the mine shut at this point, enough remains to demonstrate the working conditions and methods of the nineteenth century miners.

At the end of the adit, where it reaches the silica sand, visitors will turn onto a gangway. There they will see the sand-loading chutes that protrude from evenly spaced openings through one wall. Farther down the gangway, the chutes have been removed, and looking up through the openings visitors will see the stopes; rooms from which the sand has been mined. Some of these 10 meter high and 10 meter wide stopes stretch up along a 30 degree slope for more than 100 meters. Along the roof of the gangway is the water-rippled bed of a 50 million year old sea, frozen in stone. The marks of rain drops show on an ancient mud flat. Leaf impressions and the evidence of sea life are also visible.

Visitors will then move into the large mined rooms called stopes. There, they can clearly see the room and pillar mining method with its even rows of rooms, from which the sandstone was removed, alternating with rows of rock pillars left to support the roof of the mine. In some places, the visitors will walk across the floor of the mine, and in others, cross bridges over mined out areas. They will then turn down one of the stopes and descend a long stairway to a lower mining level.

Once on the lower level, visitors will begin to move back toward the surface. They will walk along a gangway, turn onto an adit, and cut back through the strata until they reach the surface at the Greathouse Portal. Since the route out of the mine largely repeats what was seen on the way in, it will be routed past several short dead end tunnels. These tunnels can house displays showing mining equipment and the details of mining work; the general layout and methods of mining having already been explained. Also, a short side trip while on the way toward the surface will take the visitors into the Eureka lope. This steeply inclined three meter by two meter tunnel was the main entrance into the Eureka coal mine. It was driven in the 1860's and is a fine example of the coal miners' workmanship. The marks made by their picks as they carved the tunnel down through the rock to the coal beds are clearly visible. Just short of the surface, visitors may complete their mine tour by turning off the adit into a 125-meter long room that is proposed as the museum.

When the mine walk is complete, its route will be essentially level or down slope, despite the 30 degree tilt of the mine workings. The physical condition of visitors won't be a deterrent to the facility's use. The route of the walk will not retrace itself at any point. By entering and exiting at different openings, it will allow for a continuous sequence of explanation and interpretation.

The educational aspect of the mine walk will be its most important feature. It is not designed to be simply an underground hike. It will show the geological development of the preserve, and how minerals essential to modern civilization are formed. It will show the working conditions of the sand and the coal miners, and the mining methods they used. It is of value that people become aware of the importance of our natural resources and environment in our historical development and daily lives. It would be difficult to find a better tool than Black Diamond Mines to provide information about our heritage and resources in botany, wildlife, beautiful open land, and mining.

SURVEY OF SAND AND COAL MINING REMAINS OF THE MOUNT DIABLO MINING DISTRICT

Remains of the mining era are dotted throughout the Black Diamond area, generally centered around the old town sites of Nortonville, Somersville, Stewartville, West Hartley, and Judsonville. Remnants generally include mine tailing piles, railroad grades, exotic trees, and mine entrances. Within the Preserve are all the remains of both Somersville and Stewartville, and some remnants of the adjacent towns of Nortonville and West Hartley. The following includes a description of the mines, mining terms, and an inventory of the more important historical remains. Those outside the park are not available to the public and are marked with an asterisk (*).

Most underground portions of both the sand and coal mines are hazardous and those within the park have been closed. However, a few short tunnel sections on park property are accessible for public view. Flashlights are necessary to explore the longer tunnel sections. Scheduled mine tours are available by reservation.

A. Description of Mines and Mining Techniques

1. Coal Mining, 1850's to 1902

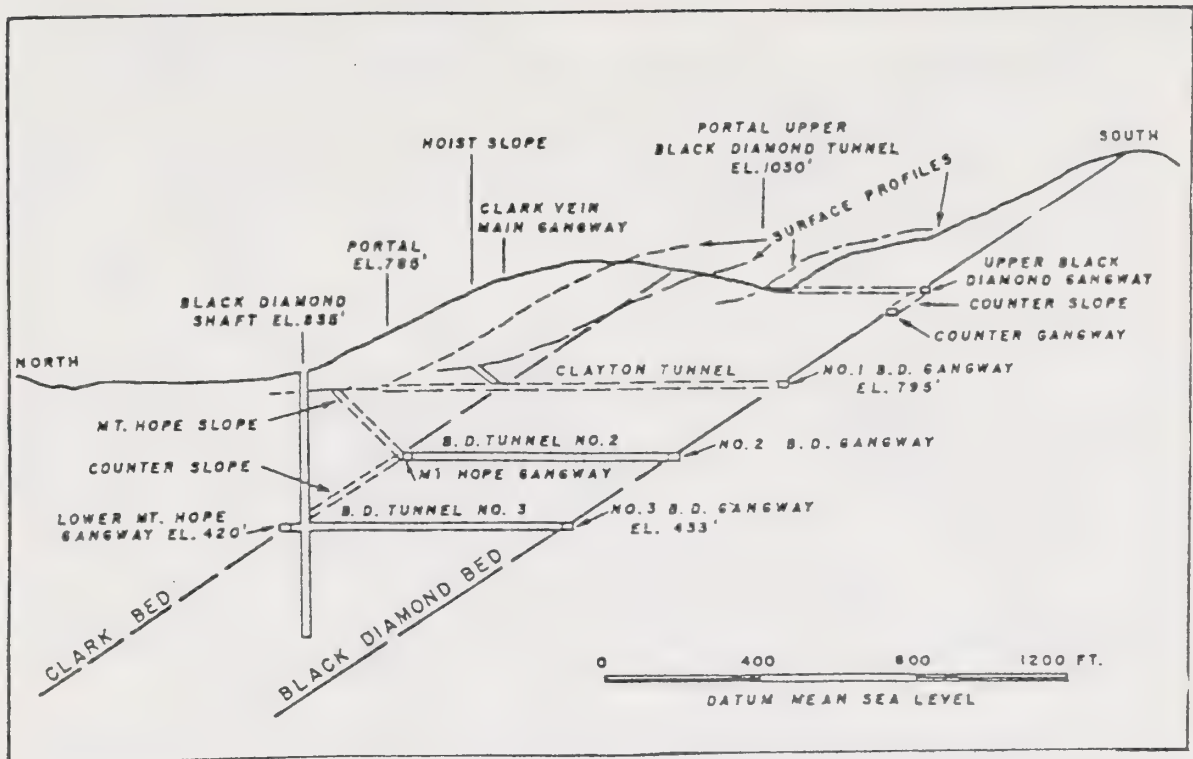
The entire mine was called the Workings and consisted of a network of passageways called Tunnels. These were differentiated by their orientations: a level entrance tunnel was called an Adit, a sloping entrance tunnel was called a Slope or Incline, and a vertical one a Shaft. The deepest shaft penetrated 735 feet below the ground surface.

The coal, sub-bituminous lignite, was located in narrow strata that tilted at a steep angle of 28 to 30 degrees. It was often sandwiched between layers of soft shale and clay rock that the miners called Bone. The coal was mined by experienced Welsh and Irish miners who often had to lie on their sides in the 3'x30" wide Stopes or Breasts. The only illumination was by oil lamps.

Not all of the ore was removed as sections of the strata called Pillars were left to support the earth and rock above. This mining system was called the Breast and Pillar method. The surrounding bone was likely to swell or cave into the workings when the coal was removed. The stopes and other tunnels were braced with wood for added stability.

- Coal from the end or Face of the stopes was pushed for as much as 400 feet to tunnels called Gangways, Drifts, or Crosscuts (5'x7' cross sections) which ran along or through the coal strata. There the coal was loaded into pony or mule drawn cars and transported to the mine entrance or Portal. On the surface the ore was loaded onto railroad cars which took it to river boats on the San Joaquin River.

Another important element of the mine workings was the system of vertical tunnels called Ventilator Raises or Shafts, which were part of the mine ventilation system. They ran from the interior of the mine to the surface or Daylight, and helped prevent the build-up of concentration of methane or carbon dioxide gas. In addition to gasses, the miners also faced the hazards of explosions, surface fires and flooding.



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SECTION - BLACK DIAMOND COAL MINE (NORTONVILLE)

2. Sand Mining

Long after the coal mines ceased to operate sand stone strata above the coal was excavated for commercial purposes. The sand mines also consisted of a network or terraced grid of tunnels, but the thicker strata allowed for larger cavities to be excavated. Large sandstone Pillars were left for support (in the room and pillar method of excavation). No wood supports were necessary.

The mining technique was more mechanized and required less manpower. A winch in the upper Machinery Drift or gangway operated a Slusher Bucket in the stope. After dynamite pulverized the sandstone, the bucket dragged the sand to the cars in the lower Haulage Drift or gangway. This method of excavation created immense cavern like rooms with 30' x 40' cross sections. The longest of these great rooms ran for approximately 800 feet.

B. Remnants Visible or Accessible from the Surface

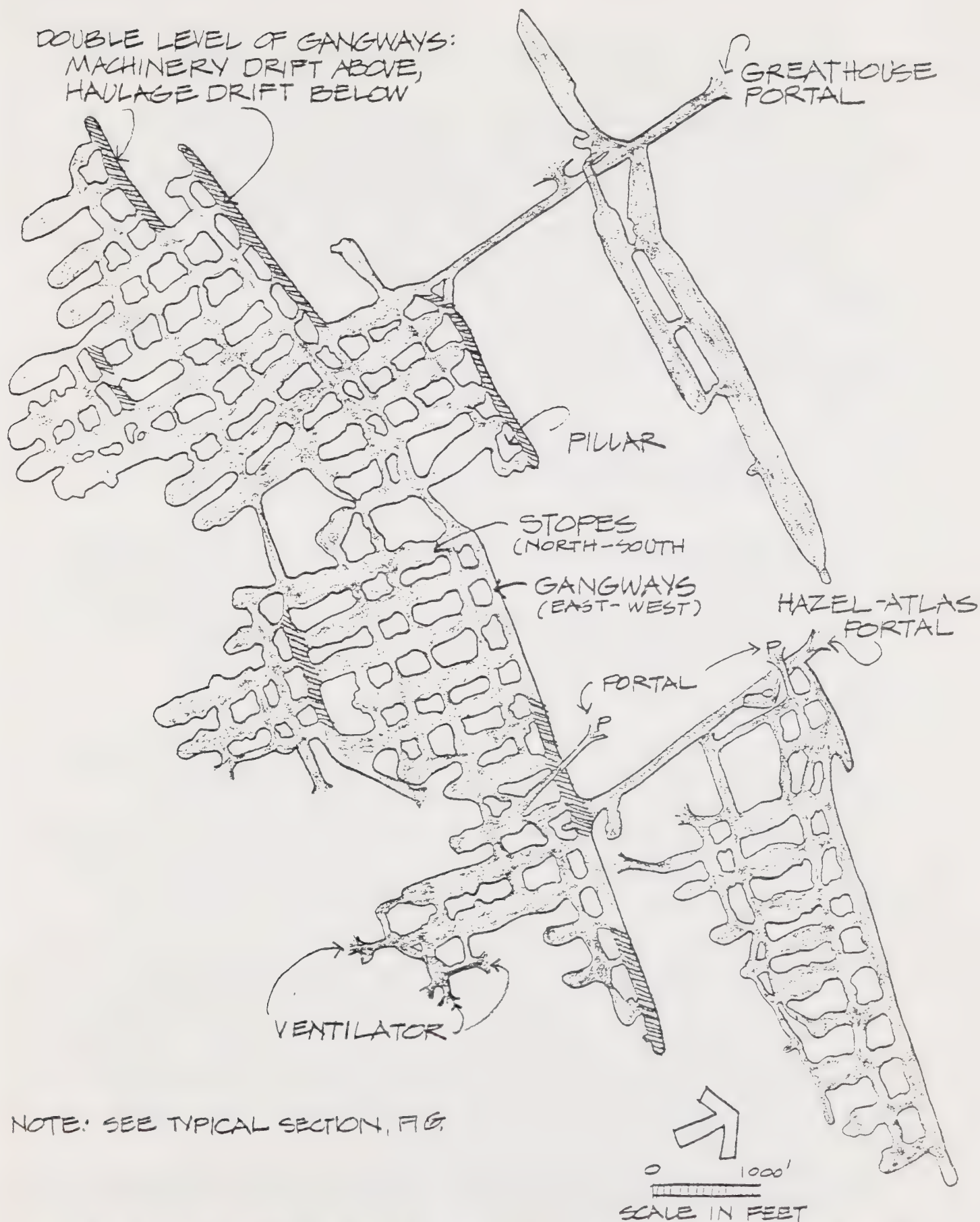
NOTE: Public access is available only to remnants that are within the park. An asterisk (*) designates remnants outside of the park and the public is not allowed access to them.

Somersville Area

1. Town: Somersville was an active mining town from about 1860 to 1902 with a population of 1000 at its peak. Somersville was not a one-mine company town as were the others in the coal field, although from 1876 to 1902 the Pittsburg Mine was the only one operating. Other mines operating at different times were the Independent, Eureka, Union, and Manhattan.

Only exotic trees, mine tailings and piles, mine entrances, a railroad grade, and a cemetery remain on the surface today.

2. Railroad: The Pittsburg Railroad transported coal from Somersville's Mines to Pittsburg landing on the San Joaquin River. Although the mining stopped in 1902, the railroad reportedly remained until 1916 when the tracks and equipment were removed. The grade or railroad bed is still clearly visible from Somersville to the Antioch city limits.
3. Coal Mines: Of the six major openings, three a, b, and c can still be easily identified on the surface. (Beside major entrances, many smaller entrances and ventilator openings can still be seen).
 - a. Independent Mine - concrete and stone boiler foundations and a 30-foot wide, 12-foot deep depression mark the top of the 710-foot deep main shaft.
 - b. Pittsburg Mine - a concrete boiler foundation and a 50-foot wide, 10-foot deep depression mark the top of the 350-foot deep Rankin shaft.
 - c. Union Mine - a spring box and water tank mark the entrance to the Union Mine.
 - d. Powder Magazine - this underground room, called a powder magazine, was used to store explosives. Its "L" shape helped to contain any accidental explosions underground and to minimize damage above ground. The age of this excavation is unknown. The entire 30-foot length is accessible.
 - e. Incline - this tunnel is part of either the Eureka or Pittsburg mine. Its age is unknown. It is accessible for 45 feet.
 - f. Powder Magazine - this level tunnel was used for storing explosives. Its age is unknown. The entire 25 feet of the tunnel is open.
 - g. Ventilator Shaft - this ventilator shaft is sealed with heavy steel grates. It is one of several such openings.
4. Stone's Warehouse: The existing barn was rebuilt from a warehouse built reportedly by a Mr. Stone who ran a business storing material brought to town on the railroad. (Barn since razed in May 1978.)
5. Cistern: The high mineral content of the local wells forced the residents of Somersville to have water hauled from Antioch. It was sometimes stored in underground storage tanks such as this one. The top foot of the 4-foot diameter brick rim is visible.



PLAN - SOMERSVILLE SAND MINES

6. Sand Mines: From about 1922 to 1949, underground sand mines provided high quality glass sand.
 - a. Hazel-Atlas Portal - this is the first entrance, or portal, excavated to mine silica sand at Somersville. The portal was reconstructed like a mine entry of the period by the Park District in 1975. It is engineered to permit access into $4\frac{1}{2}$ miles of sand tunnels and connects to the Hazel-Atlas Portal (b). This is the only extensive underground area on District land practical for public access. Visitation is now allowed by reservation only. An iron gate, wood facia, and mine car trucks are visible.
 - b. Greathouse Portal - this portal was apparently used during the later stages of the sand mining and is possibly a Pittsburg Co. coal mine entrance. The portal is closed to entry by a stone facia and iron gate. Visitation is permitted by reservation.
 - c. Ventilator Shaft - this opening is part of the thermodynamic ventilation system to maintain air quality of the sand mines. It also provides emergency egress only, and is one of five such openings.
7. Rose Hill Cemetery was the principal burial ground for those who died during the 19th century coal boon. Those buried are mainly victims of mine disasters or children who died of epidemics. Many were Welsh as is reflected in the names and poetry on the remaining gravestones. A few rose bushes and cypress trees and some remaining gravestones mark this hillside cemetery.

Nortonville Area

- *1. Town: Nortonville, with a population of about 1000 in the 1870's was one of the two largest towns on the Mt. Diablo Coal Field. Now, only a few exotic trees and the piles of mine waste (tailings) remain.
- *2. Railroad: The Black Diamond Coal and Railroad Company transported coal over this railroad grade to New York landing on the San Joaquin River almost six miles away. The rails and equipment were removed in 1885 when the mine closed but the grade is visible to Kirker Pass Road.
3. Coal Mines: At the beginning of the coal boom, there were three mines in Nortonville area; the Cumberland, Mt. Hope, and Black Diamond. By the mid-1860's they were consolidated into one company with five major entrances. Three of these can still be identified on the surface; one is within the park. Besides these major entrances, many smaller openings (more than 60 in the Nortonville area) dot the land. Most of these were ventilator openings. Those within the park have been closed.
 - a. Cumberland Mine - all of the entrances have now been sealed, and only the tailing piles mark the mine's location.
 - *b. Black Diamond Shaft - (735-foot long) is marked by the remains of the Brick Hoisting Works. The front half of this heavily-built building has broken off and is sinking into the shaft.

- *c. Clayton Tunnel - this tunnel "runs in" south nearly 1100 feet to the Black Diamond vein. From the southern end of the tunnel, Black Diamond Gangway No. 1 was driven more than $3/4$ mile west and a little less than $3/4$ mile east, for a total of more than $1\frac{1}{2}$ miles, the longest single gangway in the workings. A connection with the Manhattan Gangway on the east end, made it possible to travel between Nortonville and Somersville completely underground. The tunnel was rehabilitated in 1923, but is now caved a few feet from the surface.
- d. Upper Black Diamond (No. 1) Tunnel - this is the oldest opening to the Black Diamond vein, 422 feet from the surface. It is closed to access by a stone wall and iron grate.
- e. Air Shaft - one can enter a 35-foot tunnel to see up through a ventilator shaft to daylight above. It is a good example of the skillful work done by the 19th Century coal miners. Pick marks are still evident on the sides of the excavation.
- f. Adit - this tunnel is notable for its unusual and very strong triangular shape. It was probably a prospect tunnel; its age is unknown. 55 feet is open for inspection by the public.
- g. Adit - at one time it provided access to the coal, but it is now sealed 100 feet from the surface. The age is unknown, though it is at least 90 years old.
- h. Jim's Place - this 12' x 9' hole or room in the side of a hill was used as a dwelling. It is not known when or by whom it was dug, however, its style suggests the work of the 19th century coal miners. There is a round hole in the roof that held a stove pipe, a square skylight, and shelves dug into the walls. The little home is known locally as "Jim's Place".
- i. Two other mines, the Peacock and the San Francisco, were developed about 1 mile to the southwest of Nortonville. They marked the western edge of the coal field. Historic remains are unknown.
- 4. Pioneer Well: This hand-dug, stone-lined well predates the coal mining era and may have been one of the water sources for the town of Nortonville. A steel grate now covers the opening.
- *5. Sand Mines: A 13' x 14' opening into the maze of tennels is an example of more than two dozen such openings immediately adjacent to park land.

West Hartley**

- *1. Town: West Hartley was a small town supported entirely by the Empire Mine. Its existence coincided with the mine. It is located about $1/2$ mile east of the park boundary and is marked by mine tailings of the Empire Mine, exotic trees, graded house sites, and short tunnel entrances.
- *2. Railroad: This railroad was originally built to serve West Hartley and the Empire Mine. In the late 1800's a branch was run to the Central

Mine at Stewartville. Service ended when the mines closed, but the grade still is visible.

3. Coal mines:

- *a. Empire Mine: Exact tunnel locations have not been researched in this area.
- b. Star Mine: This tunnel was the main entrance to the Star Mine, one of the last mines that operated in the coal field. The incline, has been sealed 100 feet from the surface.

- 4. Sand Mines: This open pit sand mine was the major working of the Marchio Sand Company.

Judsonville **

*This is a very small village site on the route of the Empire Mine Railroad. Historic remains are unknown.

**Extensive study of these sites has not been done.

Stewartville Area

1. Town: Stewartville was supported by one mine (the Central) and was named after the mine owner, Mr. Stewart. The life of the town coincided with that of the mine. The visible remains are few exotic trees, the mine waste (tailing) piles, and parts of the wooden coal bunkers.
2. Railroad: During the early years of mining activity, coal was transported to market by wagon. In the late 1800's the mine was taken over by the Empire Mining Co. and a branch of their railroad was run to Stewartville. As with the other railroads on the coal field, the coal was transported to a landing on the San Joaquin River. The railroad was abandoned when the mine closed but the grade still remains.
3. Coal Mine: The Central Mine, better known as Stewart's Mine, was the largest mining development of Corcoran's Valley. It was an abundant but intermittent producer, often standing idle for months or years between periods of active mining. The mine was opened sometime in the 1860's and closed for the last time about 1900, outlasted only by the Pittsburg Mine at Somersville.
 - a. Central Mine: Extensive tailing piles mark the main portal (entrance) to the Central Mine. The tunnel extended almost 2000 feet completely through the ridge to daylight on the northern side, saving two miles of cartage over and around the ridges. The portals were graded shut in the early 1950's by a local rancher and are not visible.
 - b. Prospect Tunnel: This tunnel, driven in the 1860's, is 400 feet long from daylight to the face. At a depth of 300 feet it strikes a seam of inferior quality coal, which it follows for 100 feet to the end

of the tunnel. The whole length is accessible.

4. Sand Mines:

- a. A small open pit sand mine was developed here during the Winter of 1950-51 by the Marchio Sand Co. when their larger quarry near the Star mine was made inaccessible by heavy rains. The sand was apparently used as foundry sand.
- b. A small unidentified sand quarry was at this site.

THE NATIVE AMERICANS AND THE SPANIARDS OF THE BLACK DIAMOND AREA

The first known inhabitants of the area were Native Americans of the Yokuts tribe who inhabited a large area near the Delta. No evidence of permanent settlements have been found within the park; village sites generally were associated with permanent, important streams which are not available in the Preserve. The Spaniards took possession of the Bay Area in the 1770's. Black Diamond remained part of the Spanish Crown lands and Mexican public lands and was never part of a land grant. Cattle from the nearby Rancho Los Medanos may have grazed in the area. Use for cattle range continued with the arrival of Anglo settlers, and was the major land use up to 1852, when the coal field was discovered.



THE GEOLOGY OF BLACK DIAMOND MINES REGIONAL PRESERVE








by Stephen W. Edwards

Black Diamond Regional Preserve is one of the best places in the East Bay Region to come to study geology. It is a simple fact that the north flank of Mt. Diablo has more geology to look at than any area of comparable size in Contra Costa County. For example, while other wilderness regional parks (eg., Las Trampas) are underlain primarily by Miocene rocks, Black Diamond proudly displays a sequence ranging from Late Jurassic (see fig. one) to Late Eocene, with "everything in between." Oligocene, Miocene, and Pliocene strata are on hand as well, just outside the park, and can be seen outcropping along the entrance road through Markley Canyon. Because of this complexity, and because local economic resources (gas, oil, coal) are plentiful, much research has been focused here over the years. Hence when we enter the Black Diamond Regional Preserve, we enter a region important not only in the geologic development of California, but also in the growth of California geological science.

Approaching Somersville through Markley Canyon, interest is naturally drawn to local stratigraphy. Along the canyon, the thick sequence of strata, tilted up to steep angles, cut through and exposed by Markley Creek, affords an

impressive passage through a tremendous span of geologic time.

TIME SCALE OF EARTH HISTORY

Era	System (or Period)		Series (or Epoch)	Estimated ages of time boundaries	Life Forms
Cenozoic	Quaternary		Recent Pleistocene	2-3,000,000	Man
	Tertiary	Pliocene		12,000,000	 Mammals
		Miocene		25,000,000	
		Oligocene		40,000,000	
		Eocene Paleocene		60,000,000 70,000,000	
Mesozoic	Cretaceous		Upper (Late) Lower (Early)	135,000,000	 Dinosaurs
	Jurassic		Upper (Late) Middle (Middle) Lower (Early)	180,000,000	
	Triassic		Upper (Late) Middle (Middle) Lower (Early)	225,000,000	
Paleozoic	Permian		Upper (Late) Lower (Early)	270,000,000	 Primitive Reptiles
	Pennsylvanian	Carboniferous	Upper (Late) Middle (Middle) Lower (Early)	350,000,000	
	Mississippian		Upper (Late) Lower (Early)		
	Devonian		Upper (Late) Middle (Middle) Lower (Early)	400,000,000	 Amphibians
	Silurian		Upper (Late) Middle (Middle) Lower (Early)	440,000,000	 Fishes
	Ordovician		Upper (Late) Middle (Middle) Lower (Early)	500,000,000	 Invertebrates
	Cambrian		Upper (Late) Middle (Middle) Lower (Early)	600,000,000	 Beginnings of Life
	Precambrian			3,000,000,000+	

Emerging into the quiet hollow wherein Somersville once thrived, the hiker stands face to face with an awesome textbook example of "structural control" of the landscape. To the southwest, the rugged hills are supported by bright, bold, massive layers of resistant Domingine Sandstone. Across the valley, in Markley Ridge, the mica-rich, resistant Markley Sandstone is seen on edge, outcropping in layered bands. Underlying the townsite hollow itself is the Nortonville Formation, whose less competent mudstones have allowed erosion to carve out the depression between the two ridges.

U.S. Geological Survey

Figure 1

Once this stratigraphic layering and structural control are recognized, one can begin to appreciate the coal mines much more fully. To follow out the coal seams, miners had to follow the Domengine down as it dove steeply into the earth.

How did this thick sequence of rocks originate, and what accounts for its uplift and deformation? To understand stratigraphy and structure at the mines, we must look to Mt. Diablo. Diablo is the key to surrounding geologic structure, and the geology of Black Diamond Mines Regional Preserve is intimately bound to the history and structure of the mountain.

Mt. Diablo appears to be a "piercement fold," that is an anticline (upfold) in which a mobile core has injected overlying strata and risen to the surface. The core consists of diabase (a kind of intrusive, i. e. subterranean igneous rock) on the northwest, and Franciscan Formation on the southeast. Separating diabase and Franciscan is a band of serpentine. The Franciscan Formation is widespread in the California Coast Ranges and extends from Late Jurassic to Late Cretaceous in age. In Mt. Diablo it consists predominantly of greenstone (metamorphosed, i.e. recrystallized volcanics), broken and contorted radiolarian cherts, and graywacke (muddy sandstone). All are highly fractured and cut by veins of carbonate and quartz.

Throughout its range in California, the Franciscan Formation is a pervasively deformed eugeosynclinal assemblage (originating in and around an oceanic trench). It includes ocean floor sediments and volcanics, and metamorphic rocks (like glaucophane) suggesting high pressure, low temperature recrystallization. Some units are chaotic, with blocks of all sizes and many rock types jumbled in a sheared, fine-grained matrix. The Franciscan was probably formed in and around a "subduction zone," at an ocean floor trench, along which oceanic floor deposits were forced down toward and/or into the mantle. Much later, after subduction had ceased, some of the subducted and partially subducted rocks responded to the pressure release by rising back up. The rising melange of fractured and twisted rocks commonly uplifted and broke through overlying sedimentary rocks. This seems to be true in the case of Mt. Diablo, whose "plug" of Franciscan rocks is situated at the core of a vast anticline in local sediments.

All around the mountain, the upturned sedimentary sequence is thousands of feet thick and dips away from the mountain core, (figure two). It ranges in age from Late Jurassic to Pleistocene. The oldest rocks belong to the Mesozoic marine Great Valley Sequence. This is overlain by Tertiary rocks predominantly of marine origin. The earlier, Great Valley Sequence rocks are probably miogeosynclinal (oceanic shelf) age-equivalents of the Franciscan Formation.

Uplift, at times raising landmasses up from the surrounding sea, seems to have commenced in the general vicinity as early as Late Cretaceous time, and continued intermittantly through the Tertiary, culminating in the Pleistocene or Recent. Ancient uplifts of this kind are recognized in two principle ways. First, there are many "angular unconformities" in the GV-T (Great Valley - Tertiary) sequence, where beds were tilted up somewhat, before overlying beds were deposited horizontally against and atop them. Second, there are conglomerates in the Tertiary sequence with clasts (pebbles, cobbles, etc.) apparently derived by erosion from older, Great Valley Sequence units.

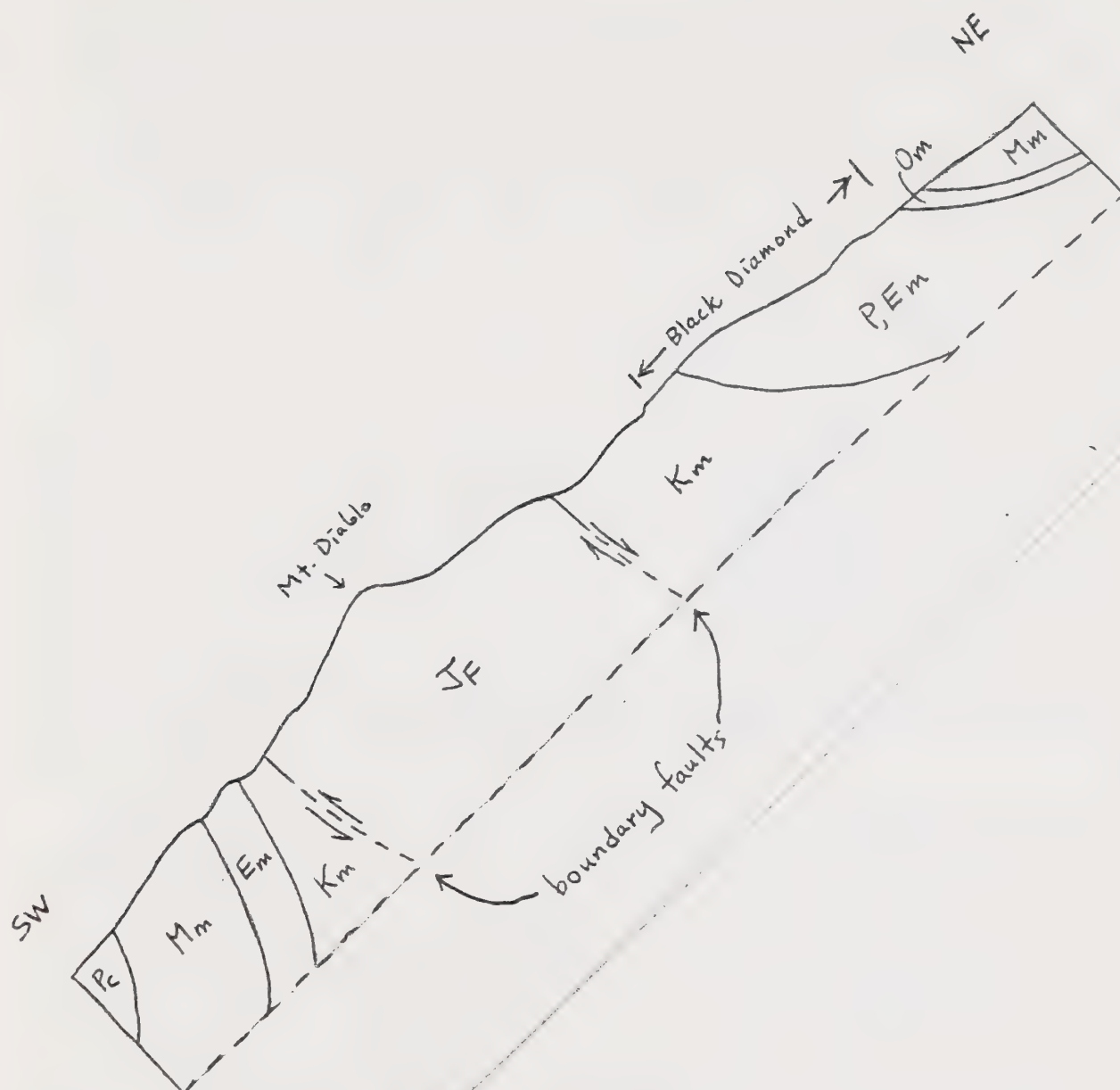


Figure 2. Generalized schematic cross section showing how overlying rocks are related to the core of Mt. Diablo. JF=Jurassic Franciscan; Km= Cretaceous marine; P, Em= Paleocene, Eocene marine; Om= Oligocene marine; Mm= Miocene marine; Pc= Pliocene continental. Sense of motion on the core boundary faults is indicated.

Black Diamond Mines Regional Preserve lies on the north flank of Mt. Diablo, and is underlain by the upturned GV-T sequence. The sedimentary strata, dipping 25-50° northeast, outcrop in a broad band from Concord to Byron, mildly arched away from the mountain. The sequence consists of the following stratified units, from oldest to youngest: Marsh Creek Formation (Late Jurassic to Cretaceous), Deer Valley Formation (Late Cretaceous); Martinez Formation (Paleocene); Meganos Formation (Paleocene to early Eocene); Domingine Formation (middle Eocene); Nortonville Formation (late Eocene); Markley Formation (late Eocene); Kirker Formation (Oligocene); San Pablo Group or Formation (late Miocene); Lawlor Tuff (late Pliocene); and Wolfskill Formation (late Pliocene). These formations, which outcrop along the east flank of the uplifted Coast Ranges, dip down beneath the Sacramento Valley in an immense syncline (downfold). Some of their lateral equivalents rise up out of the syncline to outcrop along the Sierra foothills.

Starting at the boundary fault of the mountain core, the sequence through the preserve begins with 10,000 feet of Late Jurassic and possibly Cretaceous Marsh Creek Formation. The Marsh Creek is a sequence dominated by alternating marine sandstones and mudstones (in some places approaching 30,000 feet thick), which completely encircles the mountain. In the lower part of the section, sandstones are clay-rich "wackes," and contain mudstone "microbreccias" (broken and jumbled chunks of mud in a muddy matrix). Beds are lenticular, that is they "lens out" over short distances, to interfinger with other beds. Slump folds, load casts, and groove casts (geologic jargon referring to things that are just what the names suggest), and mudstone chips, are present within the sandstones. Perhaps the chips were scoured up off the sea floor, as turbid flows of sand sheared over in undersea slides.

Outcrops of the cleaner and more regular sandstones of the upper part of the Marsh Creek can be seen in Oil Canyon, along the south edge of the preserve. Fossils of long extinct marine organisms are present but rare, and should be reported to a knowledgeable authority. Ammonites are cephalopods with coiled shells like that of the chambered nautilus, but with chambers separated by ornately complex septae. Baculites is a distinctive ammonoid which coiled for just a few whorls, then built a straight shell ending in a wide beak. Belemnites are squid-like cephalopods with complex internal shells, unlike the simplified internal shells of their descendants, the squids. Belemnites were probably offshore, open ocean schooling fish catchers. Their fossil shells are cigar-shaped and unmistakable. Inoceramus was a thick-shelled member of the pearl oyster family, with a "byssus"--a cluster of threads secreted for attachment to a substrate. Buchia was a northern latitude, probably deep water clam. The famous genus provides excellent "index fossils" for the subdivisions of Jurassic and Cretaceous time, as each species had a fairly short geologic time span, was abundant, and readily identified.

Overlying the Marsh Creek Formation in Oil Canyon is the marine Upper Cretaceous Deer Valley Formation. This is a well-cemented, ridge-forming, coarse-grained sandstone. The Deer Valley Formation is about 500 feet thick at Oil Canyon. The base of the formation is a locally glauconitic silty sandstone. Glauconite is a bright green mica-like mineral that accumulates as sand-sized pellets on the sea floor, usually between 30 and 1000 meters depth. Glauconite originates on the sea floor, through alteration of clay minerals that have been

GEOLOGIC UNITS OF BLACK DIAMOND MINES
REGIONAL PRESERVE AND VICINITY

<u>Rock Unit</u>	<u>Age</u>
Wolfskill Formation	latest Pliocene-?Pleistocene
Lawlor Tuff	latest Pliocene
San Pablo Group	late Miocene
Kirker Formation	Oligocene
Markley Formation	late Eocene
Nortonville Formation	late Eocene
Domengine Formation	middle Eocene
"Capay Shale"	early Eocene
Meganos Formation	
main Meganos	late Paleocene
Martinez Formation	late Paleocene
Deer Valley Formation	late Cretaceous
Marsh Creek Formation	late Jurassic-?Cretaceous

Figure 3. Rock units and their ages in and around Black Diamond.

transported there from the land. Apparently, decaying organic matter assists this "authigenic" (formed on the spot) process.

Throughout the world at the end of Cretaceous time, a whole range of archaic marine organisms went extinct. The famous reptilian extinctions of this time did not occur in isolation. Thus ammonites, which have been found in the Deer Valley Formation, never occur in the overlying Tertiary rocks. Tertiary faunas have a much more modern overall aspect than Mesozoic ones. The rapidity of Cretaceous/Tertiary faunal replacements is still a mystery and causes are still elusive. Shifting positions of continents, with concomittant changes in marine habitats, were probably involved.

An important unconformity separates the Mesozoic and overlying Tertiary beds. Recall that "unconformity" commonly refers to a discordance between sedimentary layers, resulting from their deposition during a time of local uplift. This is not to say the Deer Valley is everywhere at an angle to overlying units...it is in some places. In the Cowell Cement Plant area, the Deer Valley is missing and Tertiary strata rest at an angle against the Marsh Creek Formation. In the preserve, Tertiary beds are concordant on (parallel to) Deer Valley beds. But commonly there is a conglomerate containing limestone clasts at the base of the Tertiary section. The limestone clasts in the conglomerate resemble limestone in the underlying Marsh Creek Formation, suggesting the latter was exposed to erosion at the beginning of Tertiary deposition.

From Mt. Diablo through the Coal Mines and beyond, thousands of feet of Tertiary rocks are available to study. This includes more than 9000 feet of Eocene rocks alone.

The Paleocene is represented by the marine Martinez Formation and most of the marine Meganos Formation. The Martinez strangely disappears to the south of Mt. Diablo (why?), but in Oil Canyon it is about 900 feet thick. Here the Martinez consists of poorly bedded silty sandstones, with a basal conglomerate (as mentioned above). Overlying the lower sandstone is a glauconitic sandstone rich in marine megafossils (molluscs). Above the glauconitic sand is a massive siltstone which allows slumping.

Later Paleocene rocks belong to the marine Meganos Formation, which is mostly sandstone with shale interbeds. A large amount of Meganos deposits fill a meandering gorge several hundred feet deep, which has been discovered through well drilling data. This famous Meganos Gorge is a puzzling feature cut (in great part) into the underlying Martinez and/or Cretaceous sediments in late Paleocene or early Eocene time. Its origin is obscure, but since it is cut into marine sands and backfilled with marine silts and clays, it must have formed undersea. Meganos sands seem to have been transported southwestward and were apparently derived from an ancestral Sierra Nevada. The Paleocene part of the Meganos attains a thickness of around 4000 feet. The top 700 feet of the Meganos north of Mt. Diablo is early Eocene in age, and is often called the Capay Shale. It is interesting that well to the northwest under the Sacramento Valley, shales of the Capay Formation are truncated by the "Capay Gorge," a north-south trending submarine canyon cut into Cretaceous strata, and filled with mudstones, sandstones, and conglomerates of Capay age.

Overlying the Meganos/Capay is the Domengine Formation of middle Eocene age. The Domengine is the geologic focus of the park, as it contains the famous coal

seams. In addition to coal, the Domengine contains prolific quantities of gas. The formation probably merges (at least in part) under the Sacramento Valley with the Ione Formation quartz sands, gravels, clays and coals of the Sierra foothills.

South of Nortonville the Domengine displays a local conglomerate at its base. In addition to the conglomerate, the lower member of the formation consists of white, massive, cross-bedded, highly quartzose sandstones, with interbedded coal seams. The overlying middle member is silty mudstone, and the upper member consists of interbedded mudstones and thick sandstones. The sequence is about 1200 feet thick through the Oil Creek-Nortonville area. In the lower Domengine, large scale current cross-bedding, clean sands and heavy-shelled molluscs suggest a shallow marine environment. Coal beds suggest a nearby shallow backswamp or lagoonal environment, where abundant vegetation died and accumulated under-water as peat. Eastward increase in abundance of coal suggests land in that direction.

There are two main coal beds, the Clark Bed and the Black Diamond Bed 375 feet lower in the section. The $1\frac{1}{2}$ to $4\frac{1}{2}$ foot thick Clark Bed is mostly coal, but the Black Diamond Bed is six to 18 feet thick and includes much interbedded claystone and mudstone. The coal is classed as sub-bituminous. Some lignite or brown coal has been located in the upper Meganos Formation.

Fossil wood was reported from the Domengine as early as 1861, when W. H. Brewer of the Whitney Geological Survey recorded two sizeable pieces from below one of the coals. More recently, from a locality of uncertain stratigraphic position but possibly between the two coal beds, a small but significant fossil flora was found. This is an unprecedented discovery which has never been published, though it was made sometime before 1939. The flora consists of fossil leaves in impure radiolarian sandstone. Apparently the leaves, which are thick and leathery, were selectively transported from trees on land to an off-shore site of deposition. Magnolia-like leaves and a seed cluster were found, as well as leaves of monocots and dicots as yet unidentified. Also present are indeterminate seeds and numerous fish scales. If this locality is really between the coal beds, then it appears a transgression of marine waters must have invaded the area between times of swamp or lagoonal deposition. Radiolaria are exclusively marine protozoans.

Another fossil plant site, of even more uncertain stratal location within the Domengine, was of a different character. The lithology was a silty sandstone. The leaves are of large, thin, entire-margined tropical Lauraceae and vines, buried and preserved at the site where the plants were growing. This was a fresh water site.

Uplift west of Mt. Diablo in Domengine and pre-Domengine times must have been pronounced. The Domengine overlaps progressively older levels of the underlying Meganos westward from the preserve, until it overlies Cretaceous rocks in the Cowell Cement Plant area. This suggests a focus of uplift to the west, where the deepest and oldest rocks were exposed to erosion.

The Martinez, Meganos, and Domengine formations are largely shallow marine deposits, thought to record continental shelf sedimentation. At the end of Domengine time, the area gave way to the environment of the Nortonville

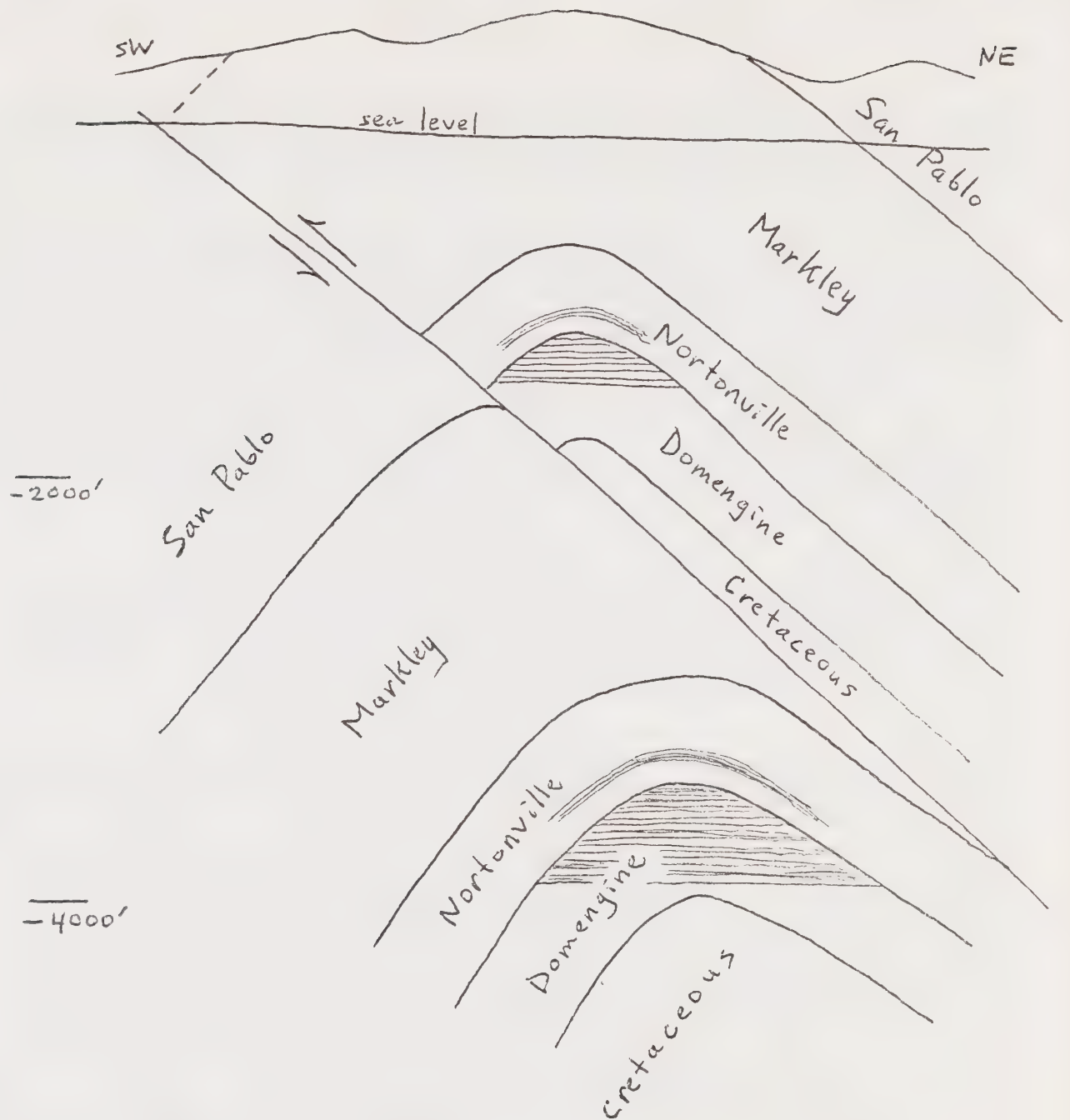


Figure 4. Simplified schematic subsurface cross section of the Los Medanos Gas Field north of Concord. Fine-lined areas are gas reservoirs. Note the offset on the thrust fault. Simplified after Maxwell and Roth (1964).

formation. This was a deeper water phase of the "Domengine transgression." The Nortonville Formation consists mostly of mudstone, with lesser sandstone interbeds. North of Mt. Diablo the Nortonville underlies and accounts for a band of subdued topography from north of Clayton to southeast of Kellogg Creek.

The Nortonville has produced gas from the Los Medanos and Willow Pass gas fields. Almost all the Paleocene and Eocene formations in this general area produce gas and some produce oil. There are in fact many well fields throughout the Sacramento Valley. Oil reservoirs with "gas caps" have been intercepted as far down as Upper Cretaceous in the Brentwood Field.

Unlike coal, which is derived from macro-plant remains, it is generally believed that petroleum (oil and gas) is derived from oil of ancient diatoms. Diatoms have the brown pigment fucoxanthin and store their food as oil, rather than as starch. The abundance of world petroleum should then be appreciated, since it is estimated that some $3/4$ of all the organic material synthesized in the world is produced by diatoms and dinoflagellates in the oceans.

In subsurface rocks, fluids are under incredible pressure, and migrate upward through permeable rocks (like sandstones) until they encounter an impermeable barrier (like a shale). For example, the Domengine Sandstone acts as a reservoir for gas trapped beneath the Nortonville Shale. During migration, gas, oil, and water separate, as each is lighter than the one below, water being heaviest. Thus it is often gas that is first encountered in wells. Petroleum will rise and collect wherever it encounters an impassable barrier. Hence reservoirs are often located in the cores of anticlines, but below fine-grained (hence impervious) formations. Or, petroleum may migrate up dipping beds and stop where impervious beds cut across at an angle, at an unconformity or a fault. This is the case in the Brentwood Field, where Paleocene and Cretaceous beds dip northerly at a low angle and are cut across by a southerly deepening "Meganos Gorge" unconformity surface, overlain by a shale unit which seals the trap.

It is staggering to consider the colossal scale of geologic formations and structures in the subsurface of the Sacramento Valley (figure four). There are folds within folds, gigantic faults, huge channels, unconformities, great reservoirs of oil and gas. And all this occurs within rocks at depths of a mere 5-6000 feet. On a larger scale, the GV-T sequence through the Sacramento Valley is best referred to as a faulted "synclinalorium"--i.e. a complex of smaller folds within one gargantuan downfold. The incredible complexity of structure and process at still deeper levels is only suggested by the extravagant core of Mt. Diablo.

Overlying the Nortonville Formation is the Markley Sandstone of late Eocene age. On the north flank of Mt. Diablo, the Markley occupies almost all of the Los Medanos Hills south of Port Chicago, and then extends eastward to the Kellogg Creek area. The bands of strata outcropping in the steep hillside above and north of the Somersville cemetery belong to the Markley Formation. The Markley consists mostly of sandstone, with characteristically common muscovite mica. The Markley is about 4500 feet thick. Like the Meganos, part of the Markley Formation fills a huge subsurface channel, extending from southeast of Marysville toward the Rio Vista Gas Field. In the north this channel cuts down into Upper Cretaceous rocks. Sands of the Markley Formation were probably transported

westward through the Markley Gorge and deposited as a deep sea fan in the Mt. Diablo area. Thus shelf sediments were transported through the submarine canyon, to deeper waters.

Overlying the Eocene sequence are about 300 feet of Oligocene rocks (Kirker Formation), and then, separated by a long gap in time, the late Miocene San Pablo Group. Oligocene and later rocks occur outside the preserve but the San Pablo marine sands and shales, left by a shallow inland sea, outcrop throughout nearby Contra Loma Regional Park.

Capping the entire sequence is the continental (land-laid) Lawlor Tuff, overlain by the continental Wolfskill Formation. The Lawlor consists of about 50-100 feet of volcanic ash and sediment. Volcanic bombs up to a foot in diameter were buried within these deposits. The tuff has been assigned a radiometric age of 4.0 million years ago based on the potassium/argon technique. Detailed mineralogic comparisons suggest that the Lawlor Tuff probably exploded out from a source in the extensive Sonoma Volcanic Field.

The overlying Wolfskill Formation includes about 1300 feet of fluvial (riverine) conglomerates, sandstones, and mudstones. A single skull of Borophagus diversidens, a bone-crushing, short-snouted hyaenoid dog, was found entombed in the Wolfskill. Based on the Lawlor Tuff date and on this skull, the Wolfskill is latest Pliocene in age.

Since there is no marked angular discordance between the Lawlor Tuff and the San Pablo Group, it is likely that most of the uplift of Mt. Diablo proper occurred after Lawlor and Wolfskill time. San Pablo rocks show no recognizable indication that a Mt. Diablo high existed in the late Miocene. And had the mountain uplifted after late Miocene but before the Lawlor and Wolfskill, then the Lawlor would be tilted up to a significantly lesser angle than the San Pablo Group, since the latter would have been exposed to uplift much longer. Can you picture this?

The great delta valley and its rivers, and the rolling hot and hazed yellow hills on every side--all reflect to a great extent the geologic abundance behind and beneath them. Within this wealth of geology, the section from Mt. Diablo through Black Diamond Regional Preserve is truly unique as a window on the ancient past. It is one of the most complete Cretaceous, Paleocene, and Eocene sections in California. It is an inspiration to the nostalgic geologist, who might be heard to murmur as he climbs across the weathered rocks enthralled, "uplifted sea, whose rocks recall the waves of ancient days," and "the endless, surging swollen shore still pounds in me, as if I stood at the brink of the rolling sea."

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ROSE HILL CEMETERY

By Joanne Dean and Carleen Bruins

This pioneer cemetery, located almost midway between the coal mining towns of Nortonville and Somersville, was the principal burial ground for those who died during the 19th Century boom of the Mt. Diablo Coal Mining District. Originally, it was on land belonging to the Black Diamond Mining and Railroad Company and was inherited by Emma Rose, hence the name Rose Hill Cemetery. She donated the property to Contra Costa County.

Many victims of mine disasters are buried here, while others, especially children, died in epidemics of diphtheria, typhoid, and scarlet fever that swept the area. The population of the mining district was primarily Welsh, and this is reflected in the names and poetry on many of the gravestones. Below is a photograph of Rose Hill Cemetery in 1938.



In recent years, vandalism almost destroyed the cemetery. In an effort to protect the cemetery from vandalism, a cyclone fence was erected by county crews. To achieve a well-groomed look, a soil sterilant was applied. Unfortunately, vandals do not respect fences. When the East Bay Regional Park District acquired

Black Diamond Mines Regional Preserve in 1972, one of the first improvements made was to replace the broken cyclone fence with a more attractive metal fence typical of the era.

The sterilized soil, with no plant roots to hold it in place, had eroded badly. Park District crews smoothed the soil and planted annual rye and fescue grasses. During the mining days, rose bushes, irises, and ivy adorned the gravesites in the well-tended cemetery. Cultivated plants which remain are Italian cypress (Cupressus sempervirens), pepper tree (Schinus molle), and bird of paradise bush (Poinciana gilliesii).

Today, Rose Hill Cemetery has the appearance of an abandoned graveyard. Further attempts at restoration, such as the rebuilding of brick, wrought iron, and wood enclosures, and the replacement of missing tombstones, will be undertaken as funds become available. If you have information concerning people buried here, or where missing gravestones are, please call the Black Diamond office (415) 757-2620, or the East Bay Regional Park District Planning Department at (415) 531-9300.

MANY TRAGEDIES

Many tales are told of the people who lived and died in the mining towns. Robert Anderson was the son of a blacksmith in Somersville. Robert was killed at the age of eight or nine, by a horse that kicked him when Robert grabbed its tail. His gravesite can still be seen.

David W. Griffiths was a Welsh miner who died in a mine explosion in 1876. Above his grave, buried in a row, are three others who met the same fate. To the lower right of these gravesites is a large brick enclosure. Here lie fifteen miners who were killed in a mining disaster in Nortonville. Little is known about these men. The tombstone that once displayed a newspaper article telling of the tragedy, and the identity of the victims, no longer remains intact.

THE LEGEND OF GRANNY NORTON

Among the noteworthy headstones still remaining in the cemetery is that of Sarah Norton, widow of Noah Norton, the coal miner who gave his name to Nortonville, and who is credited with building the first house there in 1861. Sarah was a midwife accomplished in all forms of medicine, and was well liked in the mining district. After each child that she helped deliver, she planted a cottonwood tree in Nortonville, several of which are still standing. Sarah was thrown from her buggy, when her horse, frightened by a train, ran away as she was hurrying to help a sick friend. She died on October 5, 1879.

Sarah was never a devoutly religious woman. In fact, she was somewhat of a scoffer. Just as her body was brought into the church, a great storm arose, forcing people back into their homes, and causing animals to stampede for shelter. The next day, friends returned to resume the funeral service, and once again a storm arose, which drove them away from the church. Finally, her body was taken to the grave, and "Granny", as she was affectionately called, was buried without a church service. It is said that Sarah is the mysterious "Glowing Lady" or "White Witch" that has been seen in the cemetery at night. Some people believe that she and other "spirits" have been disturbed by the wanton vandalism, and are trying to protect their final resting place.

This sermon was delivered at the Welsh Church in Nortonville on September 20, 1891 by Rev. David Hughes. The original handwritten copy of this sermon was furnished by John A. Davis, retired Contra Costa county probation officer, who resides in Martinez. Mr. Davis is a great grandson of Rev. Hughes. Mr. Davis' father, Warren A. Davis, a grandson of Rev. Hughes was born in Somersville in 1884. Mr. Warren A. Davis lived in Crockett from 1904 to 1966.

Rev. Hughes was born in Wales and resided in New York and Wisconsin before coming to California.

manner of teaching, is indicated in the question of the disciples.

"Why speakest thou unto them in parables." The answer we have in verses 17-18.

—his parable being the first of this method of teaching, much depended on the right understanding of it. — know ye not this parable? — and how then will ye know all parables? "Hear ye therefore."

—the place where the Heavenly teacher was, when He spoke this parable, Jesus went out of the house. He sat by the sea-side. — the sea of Galilee. — the lake of Gennesaret. 16 miles long, by about 6 miles wide. The little lake, and surroundings were beautiful. The mountains

Parable of the sower
Mat 13: 18 — Seven parables are recorded in this chapter, of which this of the "sower" is the first. — Nowhere else in the Gospels do we have so rich a group of parables assembled together, so many, costly pearls strung upon a single thread. — This chapter is a

"Beginning of a new period" in the ministry of the heavenly teacher. The past mode of teaching had not left the desirable result. Now a new and still simpler style of instruction is used, such that was specially adapted to their dullness of minds, and untrained hearts that He had not hitherto make use of this

of the word "Gennesaret" is the Garden of Beauty. — The olive-yards, and vineyards crowned the high and romantic hills bounding it to the east, and the west, the citron, the orange, and the date-trees were there in abundance.

— the waters of the lake. — were soozet, cool, and clear to the very bottom, and gently breaking in the fine white sand along its shores. The feet of Him who was the "son of God" trod those sands. His foot-prints were seen, and followed by the multitude.

— He walked upon those waters, only a word from His mouth calmed the waves. — When in need of women,

all He had to do was to send Peter with fish-line and hook, and the first fish he caught brought out with him money enough to pay the taxes. The lake was His Bank, the fish His cashier.

— On the edge of this beautiful lake, Jesus, sat — and a great multitude assembled, — they probably, as on another day pressed upon Him, so that He found it convenient to enter into a ship and putting off a little from the shore He taught them from the fishing boat. And He spake to them many things in parables.

— Looking up He could see, on yonder hill-side, a man scattering the seed: undoubtedly it was sowing time.

Jesus, "made, and said every thing beautiful in its season." "Behold," said the heavenly teacher, "to draw the attention of the great multitude — can you see on yonder hill-side that man scattering the seed? Now He gave a lesson on preaching the Gospel. The word of the Kingdom — what a beautiful explanation, of what Gospel ministry should be — How definite — The word of the Kingdom also in this parable, the heavenly teacher,

divides the hearers of the Gospel into two distinct classes. — Bad ground — and, ^{good} ground — unfruitful — and fruitful. — "Hear ye therefore the parable," as explained by the heavenly teacher Himself, — it is impossible for Him to make a mistake.

I — The unfruitful hearers of the Gospel. — They are here classified. "Way-side" — "stony places" — "among thorns"

The "way-side" — hearers
This ground is not prepared to receive the good seed, — it was hard-unbroken. The seed could not sink down into it, the seed lay exposed on the surface. Passers-by trample it under foot, heavy wheels crushed it, the birds picked it up.

Thus men expose their hearts as a high-way to every evil influence of this world to trample, till they become hard as a pavement. They lay a waste the new soil in which the word of the Kingdom should take root and grow.

— When man's mind is full of business, amusement, and evil influence, when he comes to hear the "word of the Kingdom," the good seed will be trampled, crushed, or picked up ^{fallen} on the surface.

— It is right that we should take the best care of the things of this world during week-days. But lock up the wheels of business, keep them in their proper places on the sabbath day, that they will not run over the good seed of the Gospel and crush it. Things not wrong in themselves may suggest the thoughts that the good seed cannot take root, beware of lawful things.

— But what makes the case the more hopeless still is that there is true

watching to take advantage of that evil condition of the heart. "The wicked one catcheth away that which was sown in his heart." This takes away even the possibility of the word of God to take root. The wicked one does this by sending his ministers, they appear to be very harmless indeed.

"The birds of the heaven" devoured it. "That they may not believe and be saved." But however harmless the instruments, the wicked one uses, looks to be, they endanger our salvation. - By their ~~own~~ immediately taken away the word that was sown in their hearts. "This is he which received seed by the way side." - Of such hearers Jesus said "my word hath no place in you."

In the love of Christ is strengthened by tribulation, - persecution drives him nearer Christ. Sun shine makes the tree that is well rooted to grow, but the tree that has no root withers, - storms develop the trees that are in a deep soil, - but will blow down those that are in a shallow soil, on the rock. "straightway he is offended."

How easily some would be Christians, are offended. When the least trial comes they fall away. But if we are truly converted, "if the sword of the spirit," the word of God, which is active, and sharper than any two-edged sword, has pierced, even to the dividing of soul and spirit - if we are united to God in Christ and not

the "stony ground" hearers. By "stony ground" we are to understand a thin layer of soil on the rock - no depth soil. Here the seed springs up quickly, and grows well for a time, but soon withers and dies. "Because they had no root."

This class of hearers are numerous the present day. They want to be religious, - they begin to build but are not able to finish. - They go with the crowd, shouting - "Hosanna, to the son of David today, - and to-morrow with the rabbis - crying 'crucify him, crucify him.' A little disposition and ^{they} are discouraged. - straightway he stumbleth."

But the one who is rooted

neverly to a church - or sect, creed, or to a minister. - if united to God in Christ.

We want let anything drive us away, we will not. In time of tribulation fall away. - On a certain day when the crowd were hearing Jesus, Jesus walked no more with him, - I can hear him asking the twelve disciples, - "would ye also go away?" "Lord to whom shall we go?" was their answer. We will cling to thee whatever others may do, or fail to do. My beloved friends what we

Need is, a personal savior.

Having Him, all trials will only drive us nearer to Him. The stormy wind of death - and the swellings of the Jordan will leave us safe on our own side, where we will be at Home with the Lord.

again. The parable of the two builders will help us to understand this point. One of them was a "stony ground" hearer, the other was a right kind of hearer, he dug deep he secured a good foundation. The builder said, the superficial hearer may receive the word with joy. But having no deep sense of sin - no depth of character, he is easily discouraged, and swept away.

Jesus never hid the bright side but, as men do when they want recruits, as our orators did before the war, painting the glories, saying nothing about the hard-ship and perils of a soldier's life.

But Jesus told His disciples "In the world we shall have tribulations"

while; then when tribulation or persecution cometh because of the word, straightway they stumble." - the third class.

The "stony ground" hears. He also that received seed among the thorns. The soil is good - richer the soil the more the weeds. His ground received the good seed. But it is not enough to plant good seed, there must be cultivation. The weeds must be kept down, or the thorns will spring up, and choke the seed.

The professed Christian who has no time to read his Bible, and pray every day, no time to attend prayer meeting, sabbath school, and the preaching services of the sabbath, he may not know that the thorns are smothering him.

He told them to deny themselves, and take up the cross. He told them, they must expect to be lied about and persecuted. Many would be Christians, if it didn't cost them anything. But they shrink from a life of self denial for the sake of Christ, and their souls.

Men, the present day will sacrifice fortunes, and lives for their opinions. Ask the same men to deny self - take up the cross and follow Christ and they will refuse, hate, and persecute us.

These are they that are sown upon rocky places, who when they have heard the word of the Kingdom, straightway receive it with joy, and they have no root in themselves, but when tribulation

cometh, they are cast away. The cares, riches, and pleasures of this life. When satisfied in going to church once on the Lord's day, soon he will take no interest in the work of God, and the word sown in his will yield us fruit.

Satan has three lines of attack, first he tries to keep men from becoming Christians, then if he fails here, he tries to keep them from being active, and useful Christians, and if he fails here also, then finally as a last resort he tries to blacken their characters, they must suffer persecution, and if the world has not anything to say against us, it is not likely that Christ has anything to say for us. I would like to see you will give special attention to the two sayings

of the divine teacher about "the word of the kingdom"
 — the "seed among thorns,"

He says that "the cares of this world, and the deceitfulness of riches," — this world wants two things. — the world wants care — trouble, and anxiety, as it is a snare to the poor. — And the world in its charms, amusements, and pleasures, as it hinders the rich.

— We are in midst of danger.
 In the Bible we have a prayer of a good man. He asks God to give him two things, and keep them not from him. Listen, "Give me neither poverty, nor riches." Why? "Again", well "lest I be poor, and steal, and take the name of my God in vain." or "lest I be full, and deny thee, and say —

"come, that you may lay hold on eternal life." That will be a great bargain, to exchange "uncertainty" for "certainty" — riches of this world for the riches of glory — viz. "eternal life." — We all are looking for bargains. This is the chief one — eternal life — lay hold on it. —

The time will not permit me to speak of the "good ground" — which brought 30-60-100-fold. But my beloved friends, let me urge upon you all,

— cultivate that good soil of yours, — keep the weeds down. — I am afraid that the weeds are going to choke the seed in California, and that God must visit us in His judgements, and prepare the soil here for His blessing. O, my beloved friends.

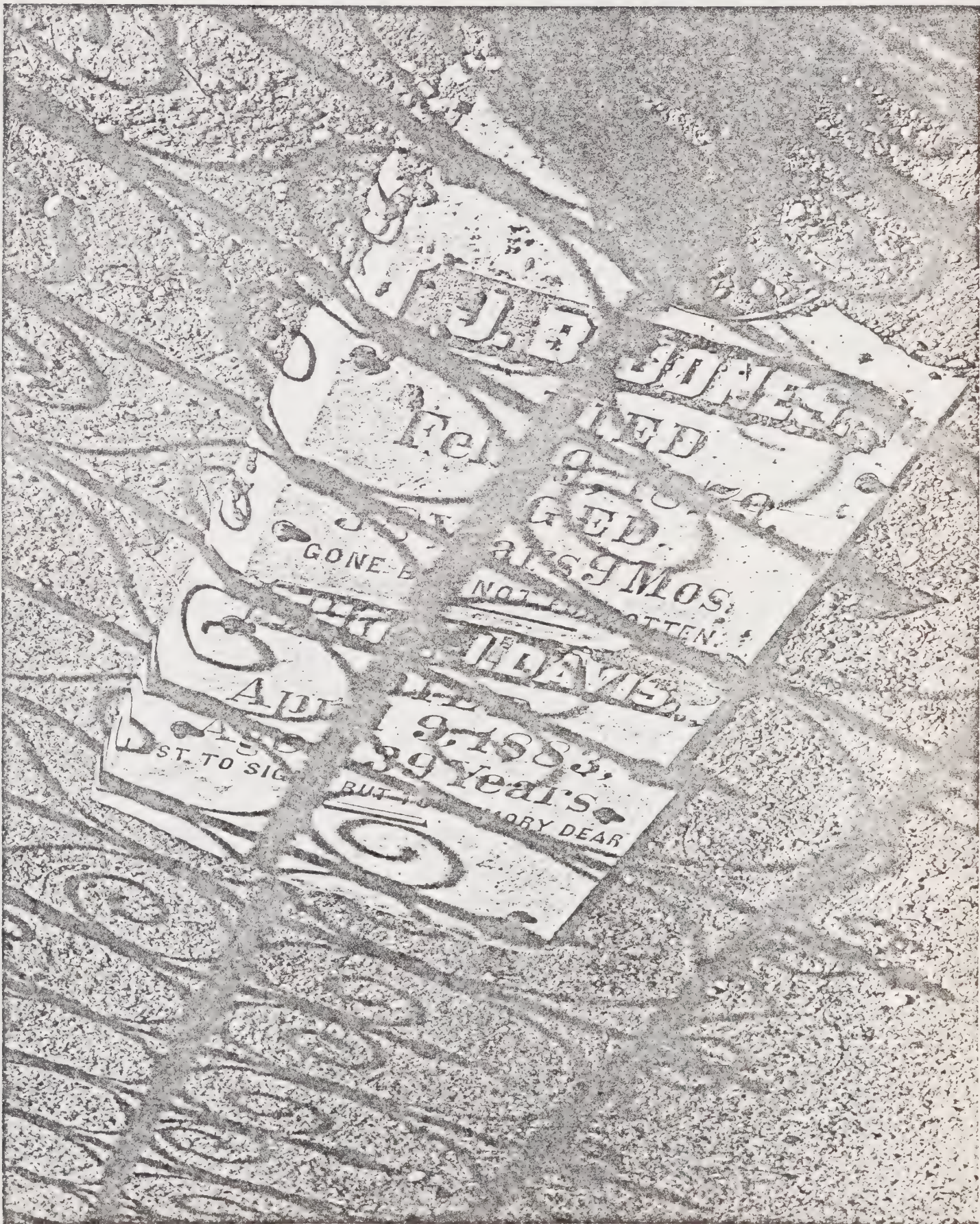
— Do not turn away from

"who is the Lord?" — His word "showeth" — destruction, and perdition.

How many young men started out as active Christians. But to come rich, and riches shocked his activity, if not his piety. When he became rich he found that instead of him having riches, riches had him, he became slave to his money. I can hear some one asking,

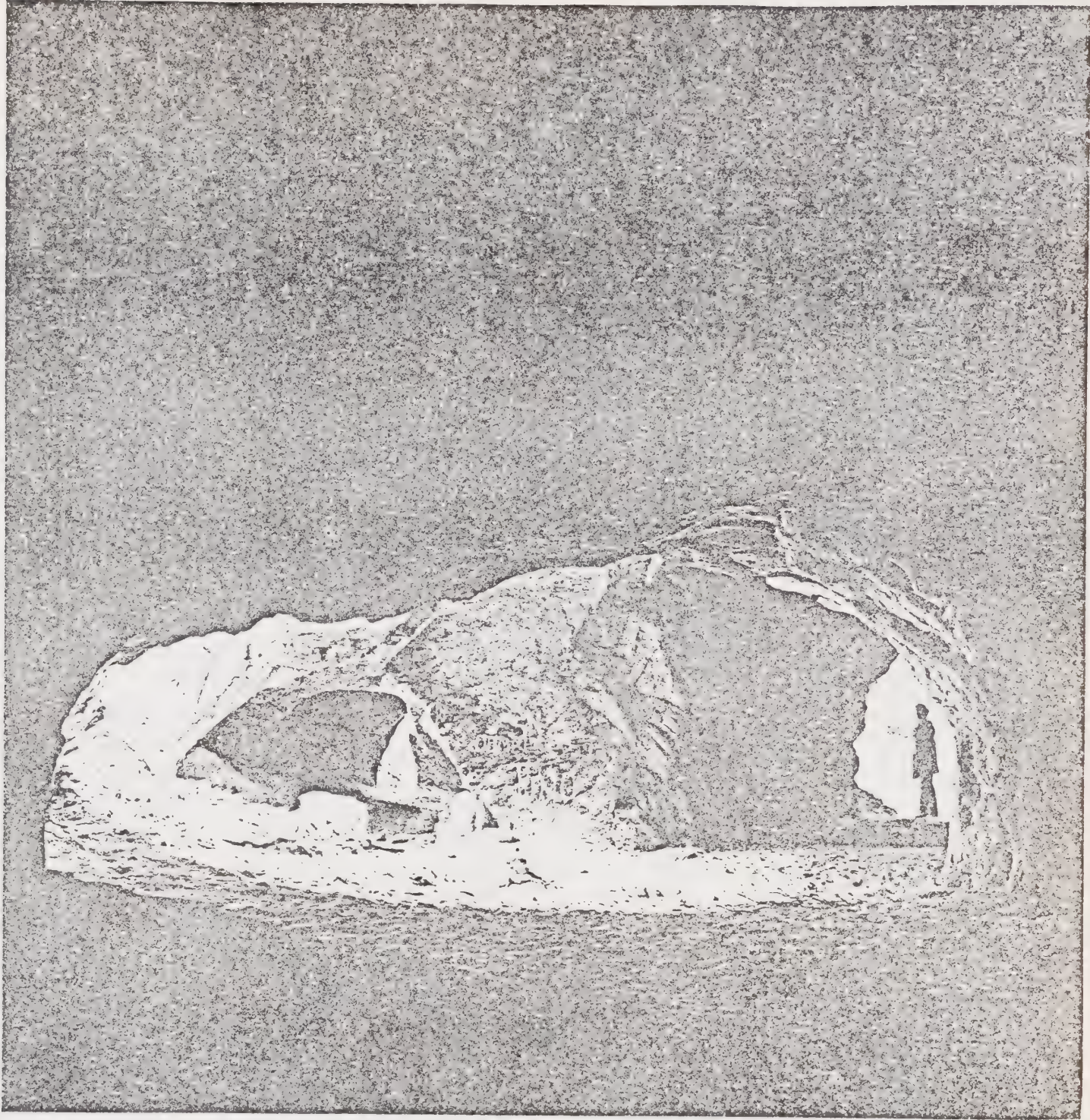
— so you preach against making money in an honest way? — no, no. I tell you, my beloved friend "I riches will increase, don't set your heart on it." — don't trust in uncertain riches." — But in the living God. — do good — lay up in store for yourself a good foundation against the time to

come, and the Bible do not give up — any thing good, and gain nothing, but warn the danger of losing your souls. — make the best use of this world, and also secure the next world in all of its happiness, and glory — seek godliness. "godliness is profitable to all things, as the promise of the world now is, and the one to come." — take hold on it. — this is the only way to make a fortune — to become rich towards God.





Nortonville in the 1870's



Sand mines at Somersville - 1968

EXISTING DEVELOPMENT

ACCESS ROADS AND PARKING

Current auto access points to the parkland are Somersville Road, and Fredrickson Lane off Lone Tree Way. Somersville Road serves as the major access point to the park. An 80 car parking area is located at the southern end of this narrow, winding road, four miles south of State Highway 4.

Access on Oil Canyon Trail into the preserve is available from Contra Loma Regional Park where parking is available at the swim complex.

Nortonville Road, off of Kirker Pass Road, is a county road which was previously connected to Somersville Road. This road has been closed just south of the intersection with Black Diamond Way about 1/2 mile from the park boundary. There is no public access into the park from that point, although some trespassing takes place at the risk of a citation by the police.

Black Diamond Way is an unpaved road which is impassable in wet weather. This road touches the park in one location but parking is not available and park boundaries are not apparent. A 100-foot wide corridor at the southeast corner of the park extending within 133' of Empire Mine Road is currently used as park service access. Public access to this area is not available.

SERVICE ROADS AND TRAILS

Many miles of graded service and fire roads traverse the park creating an extensive trail system. These roads are maintained and used as fire access routes as required by the Riverview Consolidated Fire District and the Park District. During wet weather, the clay soils and steep slopes make these surfaced roads impassable. Oil Canyon Trail is an all-weather road from Fredrickson Lane to the intersection of the Star Mine Trail where stock corrals are located.

There is a loop trail for hiking only to the ridge from Somersville through chaparral and named Chaparral Trail.

MINES AND MINE SAFETY

The mine workings and associated tunnels and ventilation shafts have posed significant safety hazards in the past.

Mine hazards included unprotected vertical shafts, unstable structural conditions, and poor air quality. The Park District has undertaken a \$140,000 program of mine hazard abatement which has included underground and above-ground survey, fencing, sealing, air quality tests and ventilation, production of resource and rescue maps, and closure of 76 mine entrances. Mine closures have been designed to be as permanent, maintenance-free and vandal-proof as is economically possible. Closures are designed to result in minimum visual and environmental damage. Four types of closures have been used: Complete closure, ventilation only, ventilation and emergency egress, and controlled access. Safety work has been done to provide maximum flexibility for future public access and use. Some safe tunnels are available for public access.

RECREATION FACILITIES AND USE

Small picnic areas have been developed at the Somersville site, a short distance from the parking lot. Approximately 15 picnic tables and braziers are available, as well as drinking water and chemical toilets. Interpretive signs describe the historic significance of certain areas throughout the park.

THE CLIMATE OF BLACK DIAMOND

Black Diamond is characterized by a Mediterranean climate; cool, wet winters and hot, dry summers. Weather data for the parkland itself is not available; the nearest station is on the plain to the north, at the Antioch Fibreboard Plant. Average daily temperature records (°F) at the Antioch Fibreboard Plant are as follows:

<u>Jan.</u>			<u>Apr.</u>			<u>July</u>			<u>Oct.</u>		
Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean
54.2	37.2	46.7	73.5	46.3	60.5	91.2	57.2	74.0	77.5	49.0	63.2

The temperatures at Black Diamond may be expected to vary more than Antioch as it is more removed from the moderating influence of the Delta and its associated wind "corridor". Fall, winter and spring are generally mild with pleasant daytime temperatures; summers tend to be uncomfortably hot and park visitation drops off during this time; high temperatures can exceed 100 degrees F. with corresponding low humidity, resulting in periods of high fire hazards.

Winds are predominantly westerly, particularly during the warmer months. During the cooler part of the year, wind direction is more variable. Northerly winds following winter cold fronts are particularly strong, gusting to 40 or 50 miles per hour on the ridges. Easterly winds during the winter are generally accompanied by dense tule fogs. At such times, visibility may be reduced to zero. The parkland is generally free of the summer fogs typical along the coast.

Contra Costa County Public Works Department rainfall maps indicate that average annual rainfall for the parkland varies from 15 inches to 20 inches, depending upon elevation. Rain falls mostly between the months of October and May. Snowfall is occasional. The rain is generally intense and of short duration.

THE VEGETATION OF BLACK DIAMOND

The varied terrain and underlying geologic formations support a range of vegetation types. The Preserve is noted as the northern limit of distribution of Coulter pine, black sage, desert olive and dudleya (*D. cymosa* var. *setchellii*). In addition, several species restricted to the San Francisco Bay occur within the preserve, including the Mt. Diablo manzanita, Mt. Diablo helianthella and Mt. Diablo globe lily. The plant communities of the preserve are described below:

1. Grassland: Grassland occupies approximately 60% of the Preserve's total area, in the valley bottoms and lower slopes, as well as the ridges of the Markley formation. The grassland is dominated by European annual species; however, remnant native perennial grasses and wildflowers are widespread within the park in the areas of shallow rocky soil. The dominant exotic

grasses are wild oats, wild barleys, bromes, and ryegrass. Common natives are needlegrass, creeping wildrye and oniongrass. Historically, the grassland and open woodland areas have been used for cattle range.

2. Foothill Woodland: In areas of deeper soils, the grassland gives way to a well-developed foothill woodland. This occurs on the slopes above Corcoran's Valley and Oil Canyon and in the hills above Nortonville and Somersville. Blue oak and buckeye are the dominant trees, but other species occur in smaller numbers, including black oak, coast and interior live oak, valley oak, and hop tree. On sandstone, digger pine and parry manzanita are also present. Understory vegetation consists of grasses and herbs.
3. Mixed Evergreen Forest: On the Domengine formation in Coal Canyon southwest of Nortonville townsite, the woodland changes to a more forested situation on the north-facing slope, dominated by evergreen species. The area is covered mostly by coast and interior live oak, but buckeye, blue oak and a single madrone are also present. Most significant, however, is the presence of the Coulter and digger pines. These trees provide the forest quality which so distinguishes this area from the surrounding woodland. A similar situation occurs in a small area above Somersville townsite, in an area which burned in 1970. The Coulter pines are reproducing well in both areas, with numerous thrifty young trees evident. Understory vegetation is less open than in the woodland, and is dominated by shrubs such as poison oak, toyon, currant and manzanita.
4. Chaparral: The chaparral at Black Diamond is quite rich for the Bay Area. The community occupies about 300 acres on rocky dry slopes on the sandstone and conglomerate. It is dominated by chamise, manzanita (2 species), toyon, black sage, pitcher sage, chaparral pea, bush poppy, and buckbrush. Much of the chaparral has burned in recent years; in these areas, bush mallow (Malacothamnus howellii) and yerba santa are abundant. Although limited in occurrence, the chaparral and extensive rock outcrops associated with it provide cover and food sources for a wide range of wildlife and provide much of the scenic character of the park.
5. Stream vegetation: No riparian woodland exists along stream courses within the Preserve. Instead, there are bands of vegetation - chiefly salt grass and rushes - lining the stream bottoms and spring areas, with occasional individuals or small stands of arroyo, red and yellow willows, and Fremont cottonwood. At a spring near Somersville, there occurs a small stand of desert olive (Forestiera neomexicana), which may be the northern distributional limit of this species.
6. Exotic Plantings: The townsites of Nortonville, Somersville, Stewartville, and West Hartley contain numerous exotic trees which were planted during the mining periods of these towns. Blue gum, black locust, pepper tree and tree-of-heaven are the most common species. At the Rose Hill Cemetery, there are several old Italian cypress trees, one large pepper tree and several cassias. Occasional fruit trees also persist; some, such as almonds, are reproducing. These plantings are one of the major features which mark the former townsites.

A PARTIAL PLANT LIST OF BLACK DIAMOND

<i>Achillea millefolium</i>	Yarrow
<i>Adenostoma fasciculatum</i>	Chamise
<i>Adiantum jordanii</i>	Maidenhair
<i>Aesculus californica</i>	Buckeye
<i>Agoseris grandiflora</i>	Large-flowered Agoseris
<i>Ailanthus altissima</i>	Tree of Heaven
<i>Aira caryophyllaea</i>	Hairgrass
<i>Amaranthus californicus</i>	Pieweed
<i>Amsinckia intermedia</i>	Common Fiddle-neck
<i>Arbutus menziesii</i>	Madrone
<i>Arctostaphylos auriculata</i>	Mt. Diablo manzanita
<i>Arctostaphylos manzanita</i>	Parry manzanita
<i>Artemisia californica</i>	California sagebrush
<i>Artemisia douglasiana</i>	Mugwort
<i>Asclepias Mexicana</i>	Narrow-leaved Milkweed
<i>Astragalus oxyphrys</i>	Diablo locoweed
<i>Atriplex serrenana</i>	Shadscale
<i>Athysanus pusillus</i>	Dwarf Athysanus
<i>Avena</i> spp.	Wild oats
<i>Azolla filiculoides</i>	Fern-like Azolla
<i>Baccharis consanguinea</i>	Coyote Brush
<i>Baccharis viminea</i>	Mule Fat
<i>Balsamorhiza deltoidea</i>	Deltoid Balsamroot
<i>Brassica</i> spp.	Mustard
<i>Bromus carinatus</i>	California brome
<i>Bromus</i> spp.	Annual brome
<i>Cardamine oligosperma</i>	Rock Cress
<i>Carduus phyncephalis</i>	Italian Thistle
<i>Carex</i> spp.	Sedge
<i>Castilleja foliolosa</i>	Hairy Paint Brush
<i>Caesalpinia gilliesii</i>	Poinciana
<i>Ceanothus cuneatus</i>	Buck Brush
<i>Centaurea calcitrapa</i>	Purple Star Thistle
<i>Centaurea solstitialis</i>	Yellow Star Thistle
<i>Chenopodium ambrosioides</i>	Mexican Tea
<i>Chrysopsis villosa</i>	Hairy Golden-aster
<i>Cirsium vulgare</i>	Bull Thistle
<i>Clarkia concinna</i>	Lovely Clarkia
<i>Clarkia purpurea</i>	Red Ribbons
<i>Clarkia unguiculata</i>	Farewell to Spring
<i>Collinsia heterophylla</i>	Chinese Houses
<i>Convolvulus arvensis</i>	Field Bindweed
<i>Convolvulus subacaulis</i>	Hill Morning-glory
<i>Cryptantha flaccida</i>	Flaccid Cryptantha
<i>Cynoglossum grande</i>	Hound's Tongue
<i>Cynara cardunculus</i>	Artichoke Thistle
<i>Cupressus sempervirens</i>	Italian Cypress
<i>Datura stramonium</i>	Jimson-weed
<i>Delphinium variegatum</i>	Royal Larkspur

<i>Dendromecon rigida</i>	Tree Poppy
<i>Dentaria californica</i>	California Toothwort
<i>Diplacus aurantiacus</i>	Bush Monkey Flower
<i>Distichlis spicata</i>	Salt Grass
<i>Dodocatheon clevelandii</i>	Padres' Shooting Star
<i>Dodecatheon hendersonii</i>	Henderson's Shooting Star
<i>Dudleya cymosa</i>	Spreading Dudleya
<i>Dryopteris arguta</i>	Wood Fern
<i>Elymus triticoides</i>	Alkali Rye-Grass
<i>Emmenanthe penduliflora</i>	Whispering Bells
<i>Eremocarpus setigerus</i>	Dove Weed or Turkey Mullein
<i>Eriodictyon californicum</i>	Yerba Santa
<i>Eriogonum truncatum</i>	Buckwheat
<i>Eriophyllum confertiflorum</i>	Golden Yarrow
<i>Epilobium paniculatum</i>	Panicled Willow-herb
<i>Eschscholtzia californica</i>	California Poppy
<i>Eucalyptus globulus</i>	Blue Gum
<i>Festuca</i> spp.	Fescue
<i>Foeniculum vulgare</i>	Sweet Fennel
<i>Forestiera neomexicana</i>	Desert Olive
<i>Galium andrewsii</i>	Phlox-leaved Bedstraw
<i>Gutierrezia californica</i>	San Joaquin Matchweed
<i>Grindelia camporum</i>	Gum Plant
<i>Habenaria unalascensis</i>	Rein Orchid
<i>Haplopappus arborescens</i>	Golden Fleece
<i>Haplopappus linearifolius</i>	Stenotopsis
<i>Helianthemum scoparium</i>	Common Rush-rose
<i>Helianthella castanea</i>	Diablo Sunflower
<i>Heliotropium curassavicum</i>	Heliotrope
<i>Hemizonia luzuliaefolia</i>	Tarweed
<i>Heteromeles arbutifolia</i>	Toyon
<i>Heuchera micrantha</i>	Alum Root
<i>Holodiscus discolor</i>	Cream Bush or Ocean Spray
<i>Hordeum</i> spp.	Wild Barley
<i>Hypochoeris radicata</i>	Hairy Cat's ear
<i>Koeleria cristata</i>	Koeler's-grass
<i>Layia platyglossa</i>	Tidy-tips
<i>Lemna gibba</i>	Duckweed
<i>Lepechinia calycina</i>	Pitcher Sage
<i>Linum breweri</i>	Brewer's Drarf Flax
<i>Lithophragma heterophylla</i>	Hill Star
<i>Lotus scoparius</i>	Deer Weed
<i>Lupinus albifrons</i>	Silver Bush Lupine
<i>Lupinus bicolor</i>	Dove Lupine
<i>Lolium multiflorum</i>	Ryegrass

Malacothamnus howellii	Howell's mallow
Marah fabaceus	Valley Man-root
Marrubium vulgare	Horehound
Melica californica	Onion-grass
Mimulus guttatus	Common Monkey-flower
Monardella villosa	Coyote Mint
Nemophila heterophylla	Baby White Eyes
Nicotiana glauca	Tree Tobacco
Orthocarpus purpurascens	Common Owl's Clover
Osmorhiza chilensis	Mountain Sweet-cicely
Pedicularis densiflora	Indian Warrior
Pellaea andromedaefolia	Coffee Fern
Pellaea mucronata	Birds-foot Fern
Phacelia distans	Common Phacelia
Phlox gracilis	Slender Phlox
Phoradendron flavescens	Mistletoe
Picris	Ox-tongue
Pickeringia montana	Chaparral Pea
Pinus coulteri	Coulter Pine
Pinus sabiniana	Digger Pine
Pityrogramma triangularis	Goldback Fern
Plantago lanceolata	English Plantain
Platystemon californicus	Cream Cups
Poa annua	Annual Bluegrass
Poa scabrella	Malpais Bluegrass
Polygonum aviculare	Common Knotweed
Polypodium californicum	California Polypody Fern
Polypogon monspeliensis	Rabbit's Foot
Populus fremontii	Fremont's Cottonwood
Potentilla glandulosa	Cinquefoil
Prunus amygdalus	Almond Tree
Psoralea californica	California Psoralea
Ptelea crenulata	Western Hop-tree
Pteridium aquilinum var. pubescens	Bracken Fern
Quercus agrifolia	Coast Live Oak
Quercus douglasii	Blue Oak
Quercus wislizenii	Interior Live Oak
Ranunculus californicus	California Buttercup
Raphanus sativus	Wild Radish
Rhamnus californica	Coffeeberry
Rhus diversiloba	Poison Oak
Rhus trilobata	Squaw Bush
Ribes californicum	Hillside Gooseberry
Ribes malvaceum	Chaparral Currant
Robinia pseudoacacia	Locust-tree
Rosa gymnocarpa	Wood Rose
Rubus vitifolius	California Blackberry
Rumex crispus	Dock

Salix laevigata
Salix lasiandra
Salix lasiolepis
Salvia mellifera
Sambucus mexicana
Sanicula bipinnatifida
Satureja douglasii
Saxifraga californica
Schinus molle
Scirpus olneyi
Sida hederacea
Silybum marianum
Sisyrinchium bellum
Solanum umbelliferum
Solidago spp.
Stipa pulchra
Stacnys bullata
Stylomecon heterophylla
Symphoricarpos mollis
Symphoricarpos rivularis

Tamarix tetrandra
Taraxacum officinale
Thalictrum polycarpum
Thelypodium lasiophyllum
Thynsanocarpus curvipes
Trichostema lanceolatum
Trientalis latifolia
Trifolium sp.

Wyethia glabra

Red Willow
 Caudate Willow
 Arroyo Willow
 Black Sage
 Desert Elderberry
 Purple Sanicle
 Yerba Buena
 California saxifrage
 Pepper Tree
 Olney's Bulrush
 Alkali Mallow
 Milk Thistle
 Blue-eyed Grass
 Blue Witch
 Goldenrod
 Nodding Stipa
 California Hedge Nettle
 Wind Poppy
 Creeping Snowberry
 Common Snowberry

Tamarisk
 Dandelion
 Many-fruited Meadow-Rue
 California Mustard
 Fringe-pod
 Vinegar Weed
 Starflower
 Clover

Mule-ears

WILDLIFE

The Preserve is part of a major open space area extending from the Antioch-Pittsburg urban area to the Livermore-Pleasanton urban area, between the San Ramon-Clayton Valley and the San Joaquin Valley. This area of approximately 250 square miles includes extensive areas of woodland, forest, chaparral and grassland. It is rugged and remote country with few roads and settlements. Black Diamond forms part of the northern edge of this area which serves as a major wildlife domain. The remoteness of this area has served to protect its wildlife values which have been modified or destroyed by man's activities in surrounding areas. As part of this de facto refuge, the Preserve includes a healthy deer population (which is hunted on adjacent private lands) and includes large carnivores - mountain lions, bobcats, fox and coyote. One hundred species of birds have been identified within the Preserve.

1. Habitat Diversity: The extensive ecotone areas ("edge") and unusual richness of vegetation have combined to provide a highly productive wildlife habitat. The chaparral, rock and cliff areas are particularly valuable as cover for many animals which feed in the adjacent grassland and woodland. A high rodent and insect population supports in its turn a population of carnivores, including raptorial birds and insectivores. Reptiles are well represented but due to the dry, hot local climate, there are few amphibians.
2. Notable Species: No endangered animal taxa are reported from Black Diamond. In the rare classification are white-tailed kite and Alameda striped racer (a snake subspecies) which have been reported from the park. Black Diamond was recently found to be the northern limit of the side-blotched lizard; other species of the Mojavean Fauna may be expected here also. The Preserve may also contain the San Joaquin pocket mouse, which is primarily a Central Valley species. Golden eagles are often sighted.
3. Visitor Use Levels and Wildlife: Current levels of park visitor use have had little effect on wildlife. The parkland's size, ruggedness and available cover provide ample protection for animals from most human disturbance. The areas of greatest visitor use are the Somersville and Nortonville townsites, and animals have shied from these areas. Damage to swallow nest areas was noted at Nortonville, where rocks are thrown to destroy the mud nests.
4. Grazing: Black Diamond has historically been used for cattle grazing. The grassland within the Preserve is fair quality range, supporting a moderate level of seasonal grazing. The most heavily grazed area has been Corcoran's Valley, where there is a permanent water supply and soil conditions are favorable. Major benefits of cattle grazing are reduction of fire hazard, general grassland maintenance and efficient utilization of natural resources. The major drawbacks are the trampling and pollution of springs and some vegetation damage.

MAMMALS

Black-tailed Mule deer	Desert Cottontail
House Mouse	Brush Rabbit
Western Harvest Mouse	Black-tailed Jackrabbit
Deer Mouse	Western Gray Squirrel
Pinyon Mouse	California Ground Squirrel
California Mouse	Mountain Lion
Brush Mouse	Bobcat
California Pocket Mouse	Gray Fox
San Joaquin Pocket Mouse	Coyote
Dusky-footed Wood Rat	Badger
California Vole	Striped Skunk
Heerman's Kangaroo Rat	Spotted Skunk
Botta Pocket Gopher	Long-tailed Weasel
Big Brown Bat	Raccoon
Red Bat	Opossum
Hoary Bat	Long-eared Bat
Pallid Bat	Mexican Free-tailed Bat
Broad-handed mole	

REFERENCESMINING & SOILS

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Coulter Pine - World's most northern distribution of the species at Black Diamond.

BIRDING IN BLACK DIAMOND

By Jeff Wilson

Black Diamond presents a challenge to the average birder accustomed to the easy terrain of most of our regional parks. There are a variety of habitats and quite a few species not common in the greater bay area. By dividing the park into habitat units we can single out interesting species and better describe them in their own environment. Once the habitat can be distinguished, certain groups become more prevalent and almost exclusive to that environment. We can learn to appreciate the birds more if we understand the relationship between the birds and the food and type of shelter each needs for its survival.

GRASSLAND

There are very few birds that really can be considered exclusive grassland inhabitants. Most species use the grassland for foraging and seek refuge in the bordering woodland.

After the grass has yellowed and the Buckeyes have begun to drop their leaves, you may walk along any of the fireroads that pass through the grassland and the woodland habitat and startle a flock of light colored sparrows. As they fly to the trees you will notice dark tail feathers with white borders. On closer inspection the chestnut, black and white mask mark it as the handsome Lark Sparrow.

If there are no white borders and the bird is a relatively nondescript streaked brown color, look for yellow lores (the area above the eye). This could be the Savannah Sparrow. The Savannah, when frightened, flies a short distance, then returns to the ground. The Lark Sparrow finds security in brush or trees.

A more secretive neighbor is the Horned Lark, found around baldspots in the grass or fire roads on the tops of grassy hills. They will sit and wait until almost the last minute before taking wing. A patient birdwatcher will notice the sharp black "horns" and eye mask over a yellow face that gives this bird its unusual appearance.

The Western Meadowlark is the grasslands' most obvious resident, a bird a little larger than a robin, with a stubby tail, brilliant yellow breast with a contrasting black chevron below the throat. The yellow breast seems always to be turned away from the viewer, but the melodious flute-like song cannot be confused with any other bird. The Meadowlark stakes out his territory by singing from fence posts or high boulders.

Another group of birds that use fences are the Flycatchers. The Western Kingbird often flits from post to post catching insects in flight, while Say's Phoebe uses rock outcrops and brush as hunting perches. Say's Phoebe is only around during the winter and is marked with colorings similar to a little Robin.

Birds of prey use the grassland for their hunting ground as finding field mice, ground squirrels and other rodents is no problem for these sharp-eyed birds. The most common is the Kestrel (old name is Sparrow Hawk), a small Falcon that feeds on field mice as well as grasshoppers and small reptiles. A larger Hawk from the Harrier group is the Marsh Hawk. Sailing close to the grass, head

down, this long-tailed Hawk, larger than the Kestrel, has distinguishing white upper tail coverts (white rump). Females are a brown color while the smaller male is grey. Both sexes have black and white bars under the tail.

The large Buteo flying overhead is more than likely the Red-tailed Hawk. Dark head, light under parts and a rusty red tail make this an easy bird to identify.

Larger still is the Golden Eagle, a dark bird with white splotches under the wings when young, and white at the base of the tail. This is a very large bird with a wing span of 78 inches. They sometimes roost on the power lines south of the Somersville area.

The Turkey Vulture can be distinguished from the Eagle by its rocking flight and uptilted wings. It is quite a bit smaller but with no other birds to compare it with it is sometimes hard to differentiate from the larger Eagle.

The Western Bluebird hovers over the grass, hunting grasshoppers and other insects. Its flashing blue back and red-pink stomach make a beautiful contrast with the yellow grasses of autumn.

A more aggressive hunter is the Loggerhead Shrike. Not a true bird of prey, this robin sized bird feeds on small field mice and sometimes other birds. It has the practice of impaling its meals on thorns or barbs on wire fences. It can be confused with the more peaceful Mockingbird, as the color combination is similar. The Shrike has a more rapid flight and stouter build.

What the Mockingbird lacks in aggressive feeding habits it makes up for with its on-going medley of chirps, mimicked bird songs, and performing Tree Frog imitations. The Mockingbird nests on the perimeter of the grassland in oaks or other large trees. This species uses both woodland and grassland as territory.

FOOTHILL WOODLAND

On the wetter north facing slopes, trees grow closer together. We become aware of a new habitat--the foothill woodland. This vegetation group is comprised of blue oak, valley oak, coast and interior live oak, California buckeye, digger and coulter pine. The woodland exists in close relationship with the valley grassland. Many of the grassland birds nest and seek protection in the fringe areas of the woodland. Some spend as much time in one habitat as the other. So the overlap of the communities is a trove for bird watchers, as one is likely to see both woodland and grassland birds in proximity.

While picnicking under live oaks you will be aware of a high pitched twittering of a loose flock of small grey birds, no bigger than your thumb, gleaning the oak flowers for insects and spiders. This is the common Bushtit. The longer you watch in amazement at the number of these small birds flitting from branch to branch, you will soon realize that there are more than one species in this group. A larger grey-crested bird is seen hanging upside down checking leaves for oak-moth larvae. This is the Plain Titmouse, more often seen in pairs and nesting in crevices in trees and old abandoned Woodpecker holes. The Bushtit makes a woven nest of fine grasses and lichen that hangs from a limb like a wool sock.

Seen in trees, usually probing the limbs and trunks for insects is the White-breasted Nuthatch. Clinging to the underside of limbs hitching up trunks in true Woodpecker fashion is the small Downy Woodpecker. In winter Chestnut-backed Chickadees and Ruby-crowned Kinglets join the flock. Stirring up the leaves below the trees are Oregon Juncos. They are black-headed, brown-backed sparrow-sized birds that scour the woodland carpet for loose seeds.

In winter the colder weather brings two species of Woodpeckers that clean the almond and locust trees for food. They are the Yellow-bellied Sapsucker and the Red-shafted Flicker. The Sapsucker can be found around the almond trees hammering long lines of holes around the trunks and limbs. These holes apparently do little damage to the tree but supply the Sapsucker with the food he requires. The Flicker is a very unwoodpecker-like Woodpecker. Often it feeds on the ground or perches crosswise on limbs. He also has the unbird-like habit of sleeping late if the weather doesn't suit him.

In summer, along the creekbeds an almost riparian habitat exists with Fremont cottonwoods, valley oaks and willows forming a good cover for bird life. Orange and Black Bullock's Orioles and Acorn Woodpeckers can be seen going about their business here.

The Acorn Woodpecker has the communal spirit. He sometimes nests with more than one pair of birds to a nest hole, and feeding the young becomes a group effort. In the Stewartville area fence posts and old power lines become storage centers for acorns hoarded by these birds. By drilling acorn-sized holes in posts, the Woodpecker can return later with the seed and stuff it in the freshly hammered nitch. Some posts average an acorn per inch.

CHAPARRAL

On the hot south facing slopes, opposite the woodland, there exists another interesting plant community - the chaparral. The chaparral is made up of small trees and woody shrubs such as manzanita, chamise, poison oak, toyon and scruboak. It forms an almost impenetrable barrier and excellent habitat for bird watching.

The real songster of this habitat is the California Thrasher. His only real competition is the Mockingbird. His song is a medley of his notes and mimicked calls of others. The appearance of this larger than robin-sized bird is quite conservative, having a dusky-brown color, long tail and rusty rump. The only real point distinguishing it from its chaparral neighbor, the Brown Towhee, is the long sickle shaped bill. He perches on top of a manzanita or chamise plant to sing his territorial song. When frightened he retreats to the thick cover of the brush.

Besides the Brown Towhee, the Rufous-sided Towhee is also present. Its habits are similar to the familiar Brown Towhee but with its suit of orange, black and white it puts its drab cousin to shame. The Rufous-sided Towhee has a more varied song with a cat-like mew call. Also it makes a sound like a door buzzer.

Another bird which is more often heard than seen is the blue-grey Gnatcatcher, a small Bushtit-size bird. It is more grey than blue with a long black and white tail. His call, a buzzing twang, almost like a small toy banjo.

Comparable in size, but more vocal and common is the Bewick's Wren. Once one is accustomed to this small brown bird's song, it is soon heard everywhere, perhaps the most common of the chaparral birds.

There is a resident that is unique to this area, the Wrentit. A real oddity, it is found only on the Pacific Coast and is the only species of this genus found in North America. This small brown, long-tailed bird has bright yellow eyes. Studies have proven that offspring rarely leave the immediate locale after fledging. It can be heard calling with a descending whistle quickening towards the end like the cadence of a bouncing ping-pong ball.

The obvious member of this group is the ever-present Scrub Jay. The Jay is unsurpassed in his curiosity and raucous calling. Splitting his time between the woodland and chaparral, the Jay often nests in small oaks bordering the chaparral hunting for acorns and just about anything edible, including other bird's eggs. Although quite outspoken, he remains very quiet around his own nest.

A bird that shares the woodland/chaparral environs is the California Quail. He is often seen in coveys of about fifteen or more during fall, pairing off in spring, and reappearing with family in tow in summer.

A bird that is almost always found around dense stands of California Sagebrush is the Rufous-crowned Sparrow. Two more exclusive chaparral sparrows are the Black-chinned and Sage.

In early spring, migrants often visit the park. Those frequenting the chaparral/woodland complex are a host of Hummingbirds: Rufous, Black-chinned, Calliope, Allen's and the resident Anna's can be seen buzzing from Monkey Flower to Yerba Santa bushes. Migrant Warblers include Townsends, Black-throated Grey, Virginias, Wilson's and Audubon's.

Lazuli Buntings and shiny Black Phainopeplas are also yearly visitors to this dry area. The more secretive residents include the Hermit Thrush and MacGillivray's Warbler.

OTHER BIRDS

There are some birds that depend on a smaller ecosystem. This sub-habitat can be found in all three vegetation communities, but most often around grassland and chaparral. The park is spotted with steep rock outcrops and this habitat is a favorite for the thrush-like Rock Wren. Also nesting in this geological feature are White-throated Swifts which can be differentiated from the Swallows (Violet-green, Tree, Cliff, Roughwing and Barn) by its rapid and alternate wing beat. It is considered to be one of the fastest flyers; it rarely slows down to enter its rock crevice nesting site.

The Cliff Swallow constructs a mud nest. If one finds a colony of Cliff Swallows keep it a secret as they are often vandalized by unthinking people.

At the base of the cliffs in small caves hollowed out by water or animals, is where the Turkey Vulture makes its nest. The young flightless birds are a real sight as they scramble through the chaparral to avoid detection.

The rocky, steep outcrops offer ideal nesting sites for Prairie Falcon.

SUMMARY

The breaking down of the park into a few botanically or geologically distinguished habitats will enable the newcomer to Black Diamond to enjoy birdwatching while at the same time observing the very different relationships between animals and their surroundings. This is not to say that one will always find a specific bird only in certain terrain. Since birds are endowed with the amazing ability of flight, they frequent most if not all of the habitats mentioned.

Many birds that have been omitted in the descriptive text can be found in the ever growing bird list at the end of the chapter. For further study, I suggest any of three field guides.

Birds of North America by Robbins, Brown, Zim and Singer

Birds of The Pacific States by Ralph Hoffman

A Field Guide to Western Birds by Roger Tory Peterson

CHECKLIST OF COMMON BIRDS AT BLACK DIAMOND

BIRDSDefinitions of Symbols

* - occurs in small numbers or singly	Season
** - occurs in small flocks	W - winter
*** - occurs in large flocks	Sp - spring
M - migratory, non-breeding	S - summer
B - migratory, breeding	F - fall
R - resident	R - year round
? - uncertain	

Turkey Vulture	**R	Great Horned Owl	*R
White Tailed Kite	*R	Barn Owl	*R
Coopers Hawk	*FWSp(R)	Burrowing Owl	*R
Marsh Hawk	*MFWSp	Poor-will	*BSpS
Sharp-Shinned Hawk	*FWSp	Lesser Night Hawk	*BSpS
Rough-Legged Hawk	*MFWSp	Black Swift	(**M?)
Red-Tailed Hawk	*R	Vaux's Swift	**MSp
Red-Shouldered Hawk	*R	White-Throated Swift	**R
Swainson Hawk	*MSp	Calliope Hummingbird	*MSp
Ferruginous Hawk	*MFWSp	Anna's Hummingbird	*R
Golden Eagle	*R	Black Chinned Hummingbird	*BSpS
Prairie Falcon	*MFWSp(B?)	Rufous Hummingbird	*MSpF
Kestrel	*R	Allens Hummingbird	*M(B?)WSpS
Merlin	*MFWSp	Belted Kingfisher	*MW
California Quail	**R	Common Flicker	*MFWSp
Ring-necked Pheasant	**R	Nuttalls Woodpecker	*R
Killdeer	**R	Yellow Belly Sapsucker	*MFWSp
Mourning Dove	**R	Acorn Woodpecker	**R
Domestic Pigeon	**R	Lewis Woodpecker	**MFWSp
Roadrunner	*R	Downy Woodpecker	*R
Pygmy owl	*MF(W?)	Western Kingbird	*RSpS
Screech Owl	*R	Ash-Throated Flycatcher	*BSpSF
Says Phoebe	*R	Hutton's Vireo	*R
Black Phoebe	*R	Solitary Vireo	*MSpF
Western Flycatcher	*BSpS	Warbling Vireo	*BSpS
Olive-Sided Flycatcher	*MSp	Orange-Crowned Warbler	*BSpSF
Western Wood Pewee	*BSpS	Nashville Warbler	*MSp
Horned Lark	*R	Yellow Warbler	**MSpSF
Barn Swallow	**BSpSF	Yellow-rumped Warbler	**MFWSp
Cliff Swallow	***BSpSF	Townsend's Warbler	*MSpF
Tree Swallow	**MSp	Black-Throated Gray Warbler	*MSpF
Violet-Green Swallow	**BSpSF	MacGillivray's Warbler	*MSpF
Rough-Winged Swallow	**BSpS	Hermit Warbler	*MSpF
Scrub Jay	*R	Wilson's Warbler	**MSpF
Common Crow	**R	House Sparrow	**R
Common Raven	**R	Western Meadowlark	*R
Chestnut-Backed Chickadee	**R	Red-Winged Blackbird	***R
Common Bushtit	***R	Tricolored Blackbird	***?MFWSp
Wrentit	*R	Brewers Blackbird	***R
Plain Titmouse	*R	Brown-headed Cowbird	**BSpSF

White-Breasted Nuthatch	*R	Northern Oriole	*BSpS
Red-Breasted Nuthatch	*?MFWSp	Western Tanager	**MSpF
Brown Creeper	*?MFWSp	Black Headed Grosbeak	*BSpSF
Bewick's Wren	*R	Blue Grosbeak	*M(B?)SpS
Rock Wren	*R	Lazuli Bunting	*BSpSF
House Wren	*BSpSF	House Finch	***R
Winter Wren	*MW	Purple Finch	**MWSp
Canyon Wren	*R?	Pine Siskin	**MFWSp
		American Goldfinch	**R
Mockingbird	*R	Lesser Goldfinch	**R
California Thrasher	*R	Lawrences Goldfinch	**BSpSF
Robin	**MFWSp	Rufous-Sided Towhee	*R
Townsend's Solitaire	*?	Brown Towhee	*R
Swainson's Thrush	*MSp	Savannah Sparrow	**MFWSp
Hermit Thrush	*MFWSp	Grasshopper Sparrow	*BSpSF
Varied Thrush	**MFWSp	Vesper Sparrow	*MFWSp
Western Bluebird	**R	Lark Sparrow	**R
Mountain Bluebird	**MW	Dark-eyed Junco	**R
Blue-Grey Gnat Catcher	*BSpS	Rufous-Crowned Sparrow	*R
Golden-crowned Kinglet	**MFWSp	Chipping Sparrow	**BSpSF
Ruby-Crowned Kinglet	*MFWSp	Sage Sparrow	*BSpS
Water Pipet	**MFWSp	Black-Chinned Sparrow	*BSpS
Cedar Wax Wing	***MFWSp	Golden-Crowned Sparrow	**MFWSp
Phainopepla	**BSpS	White-Crowned Sparrow	*MFWSp
Loggerhead Shrike	*R	Fox Sparrow	**MFWSp
Starling	***R	Lincoln's Sparrow	*MFWSp
		Song Sparrow	*R

OTHER CREATURES OF BLACK DIAMOND

FISH

Mosquito fish

AMPHIBIANSCalifornia slender salamander
Pacific Tree frogWestern spadefoot toad
Red-legged frogREPTILESWestern Fence Lizard
Sagebrush Lizard
Side-blotched Lizard
Coast Horned Lizard
Gilbert's Skink
Western Whiptail
Southern Alligator Lizard
Western Ringneck SnakeRacer
Striped Racer
Gopher Snake
Common Kingsnake
Western Garter Snake
Night Snake
Western Rattlesnake

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BAY REGIONAL PARK DISTRICT, VOLUME 5, NUMBER 4,

AUGUST 14, 1978 AND AUTHORED BY JAMES B. ROOF,

DIRECTOR EMERITUS OF THE TILDEN BOTANIC GARDEN.

A NEW MANZANITA FROM CONTRA COSTA COUNTY, CALIFORNIA

ARCTOSTAPHYLOS BOWERMANIAE J. B. Roof, sp. nov.

Frutex erectus, arborescens, ad 9 m. altus, tumor basalis deficiens; cortex fusco-ruber; ramuli pubescentes, eglandulosi; folia viridia, coriacea, paululum scabrida, ambis paginis stomatifera. Folia variabilia: 1) aliquando ovalia vel rotundata, 75 mm. longa, 45 mm. lata, mucronata vel emucronata, basi rotundata; 2) aliquando oblongo-acuminata vel lanceolata-acuminata, 45 mm. longa, 20 mm. lta, basi rotundata vel cuneata, mucronata, petioli 15 mm. longi; inflorescentia aperte paniculata, corolla alba, 5-6 mm longa; drupa globosa, glabrata, diam. 8-12 mm., nuculi coalescentes.

Holotype: Along the Black Diamond Trail of the Black Diamond Mines Regional Preserve, 5 miles south of the cities of Pittsburg and Antioch, Contra Costa County, California. Deposited at the California Academy of Sciences, San Francisco, James Roof 1009, November 18, 1977. Isotype deposited in the Jepson Herbarium, U. C., Berkeley, James Roof 1010.

Ploidy: $n = 13$ (Dr. Ted Niehaus, December 11, 1977).

Associated Species: 1. In Chaparral: *Adenostoma fasciculatum*; *Heteromeles arbutifolia*; *Arctostaphylos auriculata*. 2. In grassland: *Pinus coulteri*; *P. sabiniana*; *Quercus*

agrifolia; *Q. wislizenii*; *Q. lobata*; *Q. douglasii* plus numerous hybrids of the four listed oak species.

Erect, tree-like or dwarfed shrub, 3 to 9 meters tall, 2 to 5 meters broad; without basal burl; bark brown-red; branchlets pubescent, not glandular; leaves green, leathery, surfaces scabrid or infrequently glabrous, stomates above and below. Leaves variable: 1) quite large, sometimes oval to rounded, 75 mm. long and 45 mm. wide, mucronate or emucronate, basally rounded; 2) sometimes oblong-acuminate or lanceolate-acuminate, 45 mm. long and 20 mm. wide, basally rounded to cuneate, petioles 15 mm. long; flowers sparsely paniculate, corolla white, 5 to 6 mm. long; fruit often depressed-globose but more usually globose, smooth, 8 to 12 mm. in diameter, nutlets mostly solid or, less frequently, separable into halves or divided into five nutlets.

Range: Inhabiting silica sand or sandstone hills at approximately 400 to 800 feet of elevation. On ridgetops or north-facing slopes, in grassland or thinly distributed oaks and buckeyes, in the Antioch Hills above (south of) the abandoned townsites of Somersville and Nortonville. Seemingly confined to the Black Diamond Mines Regional Preserve of the East Bay Regional Park District.

Few early-day botanists but the tireless Katharine Brandegee saw *A. bowermaniae* as it lay hidden away on private land in the Antioch Hills. The Bowerman manzanita doubtless left Brandegee, as it should have in those ruder taxonomic times, unimpressed. Today, however, *A. bowermaniae* lies on public park lands, is easily accessible to those willing to walk three hundred yards from a paved road to see it, deserves specific recognition and is indeed a most impressive manzanita.

In deep, well-drained sands in its restricted range high above the Carquinez Strait, *A. bowermaniae* becomes a tree up to 9 m. (ca. 28 feet) tall and 6 m. (ca. 18 feet) broad, easily as large as any member of its genus. Its largest individuals may very well be the tallest of all manzanitas (Fig. 4). A stone's throw from some of its largest specimens, however, on sand hardpan or sandstone, the species may be seen as procumbent shrubs 12 inches tall and six feet broad. In addition to the hardpan soil, deer browsing definitely contributes to the low habit of such dwarfish specimens. Shrubs of varying habits between the dwarf-giant extremes occupy pits and slopes of old sand-mining excavations that pockmark the *Arctostaphylos* habitat.

With its ploidy of $n = 13$, *A. bowermaniae* is an opposite-form floral transvestite; i.e., an *Arctostaphylos* having the habit and hue of *A. pungens* ssp. *manzanita*, but having the ploidy of *A. glauca*. Mature shrubs of the latter species occur on Mount Diablo, five miles south of the Black Diamond Regional Preserve. *A. bowermaniae* also bears a preponderant number of solidly coalesced fruits, a trait doubtless derived from *A. glauca*. The species is almost certainly a hybrid between *A. pungens* ssp. *manzanita* and *A. glauca*. This, sadly enough, will oblige John Thomas Howell to strike still another line from his Supplement to the Marin Flora (1970). The line is on page 350 of the Supplement:

"*A. manzanita* Parry. The Parry manzanita grows in the hills north of Mount Diablo near Somersville . . ."

A few shrubs of *A. bowermaniae*, growing on inhospitable sites, spring from heavily buttressed, almost burl-like, ground-hugging basal trunks that appear capable of sending up regenerative sprouts following such a shrub's destruction by fire or by cutting. The basal structures, however, are not rough-barked, show no evidence of bearing nascent buds, and are apparently not reproductive burls. The great majority of shrubs (or trees) of *A. bowermaniae* lack such heavily structured basal trunks, thus leaving this taxonomic unit safely classified as "without basal burl."

A. bowermaniae differs from *A. pungens* ssp. *manzanita* in bearing extremely variable, large to small leaves. Many of the leaves are scabrid; others are scabrid when fresh but not when dried; others are brightly glabrous. One of the leaf forms is large, leathery oval, mucronate or emucronate at its obtuse apex. Among such leaves may be found some of the largest (some of them three and one-half inches long and two and one-quarter inches wide) known in the genus. Another leaf-form of the species is an acuminate, exaggeratedly large *A. pungens*-like leaf, apically acute. The combination of large, rounded leaves,

Fig. 4. *Arctostaphylos bowermaniae* in the Black Diamond Regional Preserve of the East Bay Regional Park District. The location is in the Antioch Hills above the location of old Somersville.

— November 18, 1977



along with ovate-acuminate leaves, both kinds borne on individual shrubs, further suggest a hybrid origin for this species.

Botanical observers visiting Black Diamond Regional Preserve should not be confused by the occurrence of a few small-leaved, slick-leaved, dark-green-leaved *Arctostaphylos* on upslopes near the Black Diamond Trail in the western portion of the preserve. Though these shrubs greatly resemble *A. pungens* ssp. *laevigata*, that entity has not yet been observed in the preserve and the small-leaved shrubs should be regarded as just another form of *A. bowermaniae*.

A. bowermaniae may bear some depressed-globose fruits — an inheritance from *A. pungens* ssp. *manzanita*. However, in the summer season of fruiting maturity the berries of *A. bowermaniae* are predominantly globose, close to 10 mm. in diameter. They commonly contain a single, solid nutlet. Some nutlets of this species that are not solid are separable into neat halves, and it is not difficult to find a few fruits that separate into lesser reductions.

It is also not uncommon for the fruits of this — and other species of *Arctostaphylos* — to bear fruits that, when young, are depressed-globose but which turn globose at maturity. It is not easy to pin down the measurements of such fruits, since they may go through gradual changes in a single year, or they may vary from one shape to another in different years.

A. bowermaniae inhabits one of a dozen or so widely separated *Arctostaphylos* "islands" in the highlands of Contra Costa County. Two such isolated stations are relevant to a postulation of its origin. The first is a small population of *A. pungens* ssp. *manzanita* on Sobrante Ridge, 23 miles due west of the type locality of *A. bowermaniae*. This is the most southerly known population of ssp. *manzanita* and thus far the only one known south of Suisun Bay or Carquinez Strait. To it, or else to populations of ssp. *manzanita* north across the strait in Solano County, we may putatively attribute the *A. pungens* characters of *A. bowermaniae*.

The second manzanita population in consideration is that of *A. glauca* on the northern flanks of Mount Diablo, 5 miles southwest of the principal distributions of *A. bowermaniae*. *A. glauca* bears solid-stoned fruits. The preponderance of solid-stoned fruits in *A. bowermaniae* reaffirms the joining of *A. glauca* with *A. pungens* ssp. *manzanita* to create *A. bowermaniae*.

In observing the territory occupied by *A. bowermaniae* one wonders why *A. glauca* is not common in an area so eminently suitable to that species. The answer seems to be that *A. glauca* has been slow in arriving in the Black Diamond Mines Regional Preserve. On November 18, 1977, David Amme, in my company, discovered a young, dentate-leaved plant of *A. glauca* directly alongside the Black Diamond Trail, at the type locality of *A. bowermaniae*. The small gray-leaved, pink-branchleted shrub is now over a foot tall and equally broad. Since this immature individual may be the only one yet observed in the preserve, five miles north of its previously known northern limit on Mount Diablo, it seems to represent a five-mile northern extension of range for *A. glauca*.

A. bowermaniae has evidently occupied its silica sand habitat in the Black Diamond Preserve for a geologically long time, as demonstrated by its static distribution in the preserve's eastern portion. It should by now be frozen into position as a decadent component of its chaparral. But sand-mining, coal-mining, sandslides and other soil disturbances in the western part of its limited range have given rise to a number of fresh eco-niches for this manzanita. Thus encouraged, a goodly number of young and healthy progeny, from three years old and upward, may be observed on freshly exposed terrain, auguring well for the future of the species.

On Mount Diablo *A. pungens* ssp. *laevigata* is essentially a colony-forming taxon on open sandstones, while *A. bowermaniae* in the Antioch Hills may occur in solitary fashion in open grassland, or in thin woodlands, or in meager clusters in dense chaparral composed principally of *Adenostoma fasciculatum*. The small *Arctostaphylos* populations within the dark green *Adenostoma* stands are readily distinguishable by their yellow-hued foliage. The yellowish leaf color-cast — a chlorosis — is probably attributable to a dearth of nutrients in the silica-sand habitat of *A. bowermaniae*, since shrubs of this species turn to a bright green hue in botanic garden cultivation.

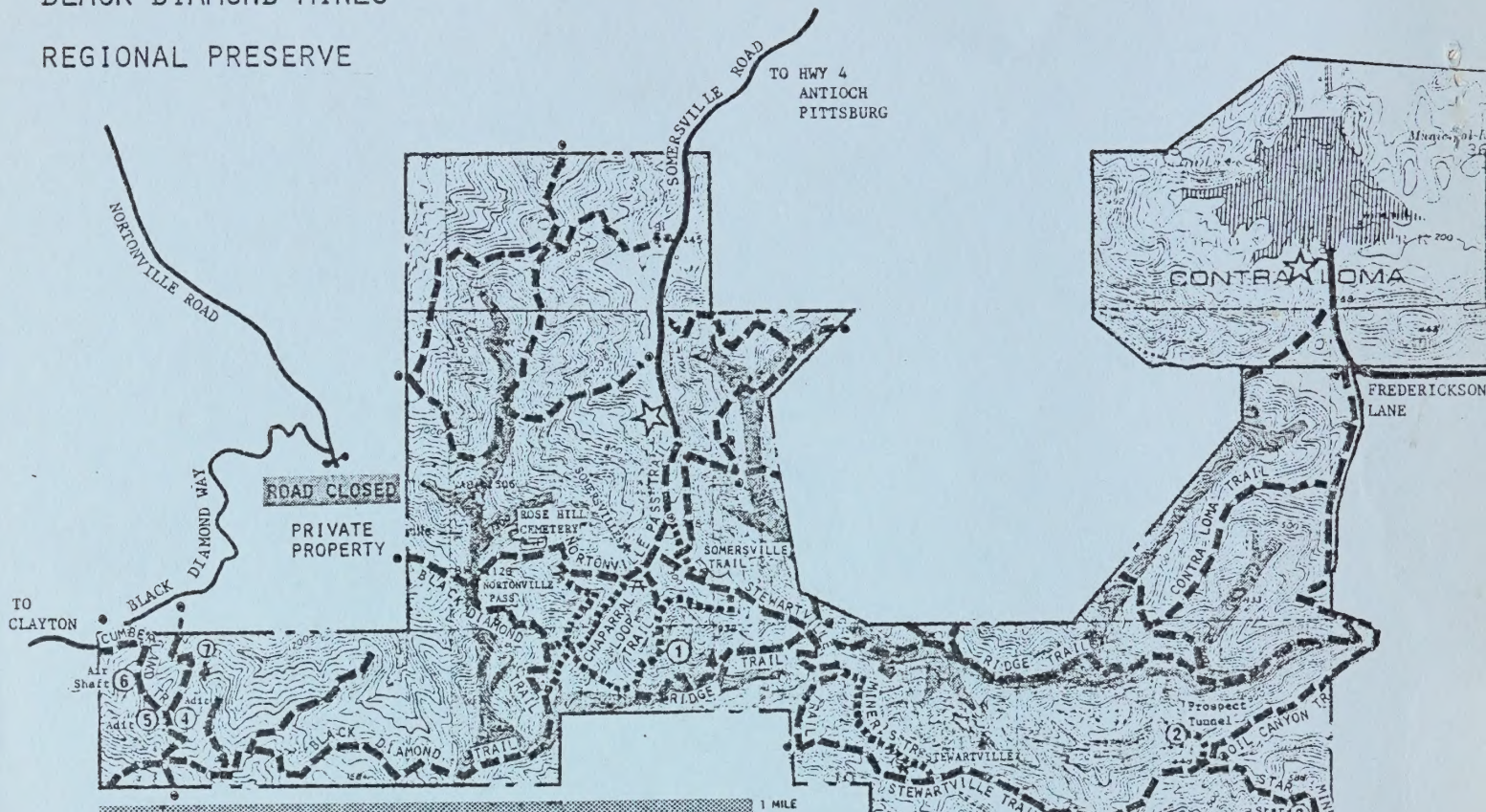
The naming of *A. bowermaniae* — along with the recognition of *A. laevigata* as a member of the *A. pungens* alliance — dissolves the riddle of two manzanitas of the Mount Diablo-Antioch Hills region of Contra Costa County and puts to rest prolonged uncertainty concerning their taxonomic positions.

This *Arctostaphylos* is named for Dr. Mary Bowerman, native plant preservationist; life-long observer of and authority on the botany of Contra Costa County; distinguished author of *The Flowering Plants and Ferns of Mount Diablo* and numerous botanical and conservation articles. It is intended to commemorate her great affection for and knowledge of the native plants of California which she has generously shared with her fellows along many pleasant trails.

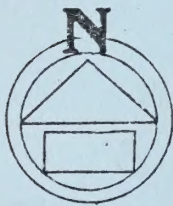
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BLACK DIAMOND MINES

REGIONAL PRESERVE



LEGEND



HIKING AND HORSEBACK
RIDING TRAILS

HIKING ONLY

PICNICKING

PARKING AREA

ROADS

RIDGELINES

PARK BOUNDARY

GATES

COULTER PINES

MINE OPENINGS:

(As numbered on park map.)

1. **POWDER MAGAZINE**--This excavation, called a powder magazine, was used to store explosives. Its "L" shape helped to contain any accidental explosions underground, and to minimize damage above ground. The age of this excavation is unknown.
2. **PROSPECT TUNNEL**--Throughout the coal mining era prospect tunnels were driven in search of commercial-quality coal. This tunnel, driven in the 1860's, is 400' long from daylight to the face. At a depth of 300' it strikes a seam of inferior quality coal, which it follows for 100' to the face, or end, of the tunnel. A light is necessary to explore this tunnel.
3. **STAR MINE**--This tunnel was the main entrance to the Star Mine, one of the last mines that operated in the coal field. The tunnel, called an incline, has been sealed 100' from the surface. A light is necessary to explore this tunnel.

4. **ADIT**--Miners call this level tunnel an adit. At one time it provided access to the coal, but it is now sealed 100' from the surface. The age of this adit is unknown, though it is at least 90 years old. A light is necessary to explore this tunnel.
5. **ADIT**--This tunnel is notable for its unusual and very strong triangular shape. It was probably a prospect tunnel, and its age is unknown. It has been sealed 55' from the surface.
6. **AIR SHAFT**--This air shaft, entered here by a short tunnel, is a good example of the skillful work done by the 19th century coal miners. The pick marks from their mining efforts over one hundred years ago are still evident on the sides of the excavation. This shaft was once much deeper, and extended down more than 150 feet into the mine. It was used to keep the mine ventilated and free of dangerous gasses.
7. **JIM'S PLACE**--This little excavation was used as a dwelling. Just when it was dug or by whom it was dug is not known; however its style suggests the work of 19th century coal miners. Notice the round hole in the roof that held a stove pipe, the square skylight, and the shelves dug into the walls. The little home is known locally as "Jims Place."



EAST BAY REGIONAL PARK DISTRICT

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